Learning-by-Making

Design-build Studios at the School of Architecture at the University of Tasmania

Book 1/2

Louise Wallis

A thesis submitted in total fulfilment of the requirements of the degree of Master of Design

May 2005

School of Architecture
University of Tasmania
Australia

Statement of Original Authorship

The author, Louise Helen Wallis, hereby declares that the material included in this thesis comprises only her original work, except where clear acknowledgment is given in the text to another author.

Signed:

Louise Helen Wallis

Statement of Authority of Access

The author, Louise Helen Wallis, hereby declares that this thesis may be made available for loan and limited copying in accordance with *Copyright Act 1968.*

Signed:

Louise Helen Wallis

Abstract

By examining the Learning-by-Making (LBM) studios at the School of Architecture, University of Tasmania (SA UTas) the educational benefits to students of LBM are identified. LBM studios allow student groups of twenty or more to collaboratively design and build a small timber project. These types of studios have developed as a regular part of the School curriculum since 1994. In doing this study, detailed information was generated on student learning experiences and their perceptions of LBM, as previously only anecdotal evidence from lecturers in LBM and similar studios was available.

The Literature Review identifies the origins of LBM studios in architectural education and its contentious relationship with higher education, the background of LBM studios in Tasmania and other similar models in North America (commonly referred to as Design/Build studios) and Australia. A surprising revelation was the absence of research examining this pedagogical model. Consequently, several methods used to evaluate education curricula were reviewed for their suitability. The Illuminative Model (a qualitative research method, using observation, questionnaire and interviews) was selected, as it provided an appropriate strategy to investigate the LBM model. It allowed the scope of the study to be progressively refined in response to new knowledge, as preliminary data was reviewed, informing the development of subsequent stages.

The findings indicate that an 'average' student participating in a LBM studio, spent half of their time engaged in high-level problem solving and cognitive activities, even though LBM studios require a lot of time to be spent on repetitive motor tasks. At the same time, students' learning experiences varied and this was a consequence of the teamwork structure and students' own willingness to experiment with ideas or construction. Despite students' varying learning experiences, the majority recognised the advantages of integrating design and construction concepts (an underlying principle of LBM studios).

This study contributes to the methodological discourse of evaluating architectural education and identifies a number of Schools of Architecture that employ the LBM

model, thus presenting further research opportunities. This study has only begun to identify and understand the potential benefits of LBM studios for architecture students. However, importantly, it has established that students' perceptions of design and architecture alter, as they begin to appreciate the critical role that construction plays in the process of executing their ideas beyond imagining, into a built form.

Acknowledgments

Over the past four years I have received an enormous amount of assistance and support from my colleagues at the School of Architecture at the University of Tasmania, friends and family, which I am in debt to and wish to extend my thanks.

I would first like to thank my two principal supervisors, Dr Catriona McLeod and Dr Andras Kelly, who have provided invaluable support and guidance in developing the production of this thesis. In particular, I would like to extend my thanks to Catriona for her dedicated assistance during the restructuring and editing of the thesis, as well as her mentoring in the first year Design Studio.

Thanks also to my supervisory team. I was very fortunate that so many senior academics were willing and helped at different stages of my research. I am grateful to Professor Roger Fay for his editorial feedback and encouragement, Dr Greg Hannan (Psychology) and Professor John Williamson (Education) for their specialist feedback, and John Hall for his erudite discussions. I would also like to acknowledge the wonderful assistance that I received from other colleagues, beyond my supervisory team, Dr Julia Gatley (detailed proofreading), Dr Paula Whitman (for reading chapters and providing external feedback) and Kerry van den Berg (proofreading and lunch-time companion).

Other valued contributors to this thesis were the LBM team/family. Ian Clayton, Robin Green and Gillian van der Schans have been fantastic supporters, as have fellow colleagues Paddy Dorney, Dr Anne Neale, Dr Z Bromberek, Richard Blythe and Greg Nolan.

Finally, I would like to recognise the important role that friends and family played in the submission of this thesis. I really appreciated Mum, Dad, Fiona, Frank, Gill, Al, Sienna, Sanden, Syliva, Ian, Basil, Trev, Lauren, Lee, Chris, Neve, Richard, Carly, Wendy, Allen, Grant and Vesna for their support, understanding, holiday adventures and cups of tea!

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AA	Architectural Association (School of Architecture, London)
AIA	American Institute of Architects
CAD	Computer Aided Drafting
CDC	Community Design Centres, United States
CNC	Computer Numerically Controlled flatbed router
CUD	Computer Use in Design (Term used at the School of Architecture at the University of Tasmania)
D/B	Design-build (Studios offered in Schools of Architecture in North America that are similar to Learning-by-Making studios at the University of Tasmania.)
EBL	Experienced Based Learning
EL	Experiential Learning
ESD	Environmentally Sustainable Design
EVP	Expert Validation Panel
FNP	Freycinet National Park, Tasmania
LBM	Learning-by-Making (Name given to a design studio offered at the School of Architecture at the University of Tasmania)
MIT	Massachusetts Institute of Technology, United States
NVP	National Visiting Panel (a part of the accreditation process for architecture courses in Australia)
RQ	Research Question
RAIA	Royal Australian Institute of Architects
RIBA	Royal Institute of British Architects
SA UTas	School of Architecture at the University of Tasmania
TCAE	Tasmanian College of Advanced Education

Preface

In 1999, the School of Architecture at the University of Tasmania (SA UTas) advertised a research scholarship in 'Learning-by-Making'. 'Learning-by-Making' (LBM) refers to a studio that allows students to collaboratively design and build small projects. From its inception in 1994, no significant research had been undertaken into this Teaching and Learning model. The School of Architecture was aware of a few studios that were a LBM type in the United States and one in the United Kingdom, but no one had followed up these links, as a result of the time commitment involved in preparing and organising LBM studios. This was a problem, as other members of staff did not express an interest or capacity to undertake such work.

At the end of 1999, I was awarded the research scholarship in 'Learning-by-Making'. I was interested in this scholarship, as I had visited the University of Tasmania twice in 1999, to research the LBM studios as a part of an undergraduate thesis and to promote this Teaching and Learning model to staff at Queensland University of Technology (QUT). As a result, two LBM projects were piloted at QUT in the second semester of 1999.

My personal interest in architectural education was born from two and half years work in an architectural office and earlier experiences as a carpenter's assistant and draughtsperson on various construction sites. Through these experiences I became motivated to learn more by gaps in my knowledge. I also wanted to be proactively involved in assisting other architecture students to make the transition from university to becoming members of the construction industry and the community.

During this research study (2000-2004), I was appointed as an Associate Lecturer at the SA UTas in 2003 and was involved in the organisation and facilitation of two LBM studios (*Bus Stop 2* and *Garden Shed*). These teaching experiences have helped to inform this thesis.

Chapter 1: Introduction

> *Architects who have aimed at acquiring manual skills without scholarship have never been able to reach a position of authority to correspond to their pains, while those who relied only upon theories and scholarship were obviously hunting the shadows, not the substance* (Vitruvius (in Cary 2000, p. 117)).

Similar beliefs to those of Vitruvius are held at the School of Architecture at the University of Tasmania (SA UTas) regarding the education of architecture students. Typically, architectural education does not allow concrete links to be established between design and construction: they are most often taught separately. The pervading culture in schools of architecture is that design is the most important of all units taught, and information provided in other units is often regarded as being less valuable. In addition, students of architecture, (particularly early in their studies) experience difficulties in making the connection between design and construction, as traditionally lectures utilise two-dimensional media, although architecture is three-dimensional.

In 1994 the 'Learning-by-Making' (LBM) studios emerged at SA UTas. They allowed architecture students the opportunity to collaboratively design and build small projects, but more importantly, for students to experience the process of realising an idea in built form. Over the years, the LBM studios have developed experimentally and become a part of the School's curriculum. The SA UTas initiated this study in 1999, as no significant research had critically examined this teaching and learning model. Moreover, in the absence of research, concerns about the value and effectiveness of LBM were emerging.

By 1999, LBM studios had been the focus of several conference papers and journal articles documenting the process undertaken to complete a particular project (Birrell 1997; Clayton et al. 1998 and 1997; Clayton 1995; Green et al. 1999, 1998 and 1997; Green and Webster 1998; Spence 1989; and van der Schans 1998). The SA UTas knew that other studios similar to LBM existed in North America and the United

Kingdom. However there was no evidence that these Schools had undertaken research into the pedagogical model.

The curriculum concerns held by the then Head of School at SA UTas, (Dr Andras Kelly) were, *inter alia*, that individual student contributions could not be easily identified in the final product. For example, did some students spend most of their time contributing to the painting of the project? LBM studios were also perceived to be very time-consuming for the students and staff involved. Therefore there was a concern about whether there was sufficient involvement in high level cognitive activities and problem solving, to warrant the amount of time and resources needed to allow students to connect design and construction issues. The LBM studio objectives and assessment procedures did not shed light on these concerns, as there were too many questions and too few answers.

Figure 1.1: LBM Projects from SA UTas (from the top, Deloraine Playground 2000, Blue Spikey Thing 1995, Cradle Bike Racks 1996 and Turners Beach 1 1999

Therefore, the aim of this study was:

> *To investigate the educational benefits that students gain by participating in a LBM studio.*

1.1 Thesis Structure

To contextualise the research, **Chapter 2** reviews the history of building experience as a component of architectural training and education since the 17th century. It investigates why its inclusion has been sporadic and how it originated in Tasmania. Finally recommendations for architectural education in the 21st century are reviewed.

In **Chapter 3**, the literature review focuses on the LBM Studios at SA UTas, by exploring their development and comparing it to other similar examples. Current practices, particularly in the United States, provide valuable comparisons, as well as the ideas underlying Experiential Learning. At the end of the literature review, specific research aims are developed to direct the main investigation.
Chapter 4 describes the research design process (based on the Illuminative Model) and the qualitative research methods used. The Illuminative Model was a useful research strategy in this study, as it did not rely on educational objectives to investigate the curriculum and identify key issues. The strategy involves three overlapping stages which enabled the researcher to become more familiar with the field of study, therefore Chapters **5, 6** and **7** report on **Studies 1A** and **1B**, **2** and **3** respectively.

Chapter 8 discusses these findings in terms of the specific research aims. Conclusions are drawn in **Chapter 9**, describing the educational benefits of LBM studios for students. The limitations of this research are discussed and avenues for further research are identified. Furthermore, recommendations are made to improve students' learning experiences by explicitly identifying the links between design and construction, as well as the capacity of LBM Studios to equip students with the skills to critically reflect and link learning experiences.

Chapter 2: Architectural Education

2.1 Introduction

In this chapter, the term 'architectural education' refers to the type of studies and training undertaken in order to become an architect. As this chapter will demonstrate, architectural education in Australia has responded to changes within the profession of architecture as well as to changes occurring within society. Amid these changes, the legacy of the earlier practitioners' direct involvement in the making of buildings has diminished. Despite (or perhaps because of) this trend, the opportunity for students to gain sufficient construction knowledge without some form of practical experience is questioned within the architectural profession and academia.

> *...ever since architects began defining themselves as professionals in the 19th century, designing and building have been seen as two distinct fields, and architectural education treated students accordingly* (Branch 1994).

The LBM Studios at the SA UTas provide a unique opportunity for students to gain practical experience in designing and building. It is important to remember the purpose of LBM has been to equip students with strategies and knowledge enabling them to combine design and construction; it is not concerned with the development of students' building skills.

This chapter will describe the relationship between architectural education and student 'making' experiences. It provides a historical background to the development of architectural education, principally from a British perspective, because Australian architectural education was developed from British models. This discussion will contextualise the emergence of the first LBM Studios, and show how the immediate context of the SA UTas and its respective Heads of School, directed this development. The chapter concludes with an examination of recent reviews of architectural education carried out in the United States, the United Kingdom and Australia and their implications for LBM Studios.

2.2 The Development of Architectural Education

In the late 18th and the 19th centuries, most of the architects who practised in Australia were British. Accordingly, established British methods for training architects were adopted in Australia (Herman 1970, p. 37; Freeland 1971, p. 202). It is for this reason that this section will examine the development of architectural education in Britain, since the 17th century. A summary of the transition of architectural training to formal architectural education is provided, drawn from the following texts: Freeland (1971), Crinson and Lubbock (1994), Kaye (1960), Lubbock and Crinson (1993), Powers (1996 and 1993), Swentarton (1989) and Wilton-Ely (1977) (for a more detailed examination, refer to Appendix 2.1).

Architectural education in Britain began outside the university system. In the 17th century there was no formal training to become an architect, surveyor or engineer, as these professions did not exist as separate disciplines at this time (Wilton-Ely 1977, p. 192). Many 'students' received training on the building site as apprentices of master craftsmen. Their direct experience on the building site meant that their knowledge of and skills with building and materials were highly developed.

By the 18th century, training had moved to the office and was referred to as 'pupillage'(Crinson and Lubbock 1994, p. 22). Again, students learnt by direct experience from the master but knowledge and skills were now related to office practice and draughtsmanship. Both the Industrial Revolution and the desire to establish a profession and define their roles from surveyors and engineers cemented the training of architects in the office (Crinson and Lubbock 1994, p. 44) (Wilton-Ely 1977, p. 193).

Consequently, the establishment of the profession and examinations for membership dominated the 19th century architectural scene. The main venue for training the architect remained the office. Concerns were also growing about the future roles and responsibilities of architects. As architects still came from a variety of backgrounds and experience, there were conflicts as to what constituted a sound education and many supplementary part-time courses evolved to support pupillage. Students were offered new experiences in studio, lecture or workshop environments. The studio and

lecture environments were commonly linked to an art and design education, whereas the workshop environment allowed students an opportunity to gain grounding in building materials and construction. The dominance of the studio, lecture or workshop-based supplement alternated. The first architecture course in Britain commenced at the University of Liverpool in 1894 (Powers 1993, p. 33).

The profession and the proponents of architectural education came together at the beginning of the 20th century and pupillage was reduced in importance and combined with a university education. The context of the university and the professional image ensured that the emphasis of learning returned to drawing and design and new methods developed within universities to teach students about architecture. It was thought that an association with workshop participation would tarnish the professional image of architects (Powers 1993, p. 35).

Professions such as architecture were admitted to universities on the agreement that the curricula would reflect the 'Positivist epistemology of practice' (knowledge generated by empirical studies) and the division of labour between research and practice (Schon 1983, p. 36). Knowledge was to be generated by scientists and scholars at the university, whereas professionals and technicians applied this knowledge into practice (Schon 1983, p. 36). Even though some members of the universities wanted to exclude professions, as it was perceived that their education involved instilling knowledge and habit, the universities wanted to appropriate 'useful knowledge' into their domain (Schon 1983, p. 36).

Developments within the university and the profession respectively, meant that the curriculum focus broadened, to include: construction, management, architectural science, architectural history, psychology, design theory and town planning (Lubbock and Crinson 1993, pp. 47-48). By this stage with the assistance of the university education, practising architects had successfully orchestrated their rise to professional status.

By the 1950s, university education in Britain and Australia of architecture students was the same in structure and in design pedagogy. Students studied at university for five years and pupillage was reduced to two years (Lubbock and Crinson 1993, p.

49). Since the inclusion of architectural education in universities, the connection between architectural education and practice has generally been 'blocked' in its delivery. For example, entry into the second degree (or part two) of Architecture may require documented work experience in an architect's office for a year or as a requirement for professional registration (outside the university).

Irrespective of whether students learned at the university or an architectural office, the main pedagogical model used was Experiential Learning (see Section 3.2). It has altered over time, in its application. With the development of the architectural profession, the office became the most direct experiential venue for learning. However, with the advent of architectural education, the studio and the workshop simulated these experiences. The design studio still retains the central emphasis in architectural education and the workshop has concurrently lost favour in the university environment. These developments may have contributed to current criticisms of architectural graduates, for example in United States (Crosbie 1995). This issue is discussed in Section 2.4.

2.3 The Tasmanian Context

There have been three distinct periods of development in Tasmanian architectural education. During the first period, between 1920 and 1968, the establishment of a Diploma of Architecture occurred and their was a struggle to have the course accredited nationally (University of Tasmania 2000, p. 5). In contrast, from 1969 to 1979, a radical and unique model was devised that received immediate recognition from the professional bodies (Tasmanian College of Advanced Education 1973, p. 12; B McNeil 2001, pers. comm., August). This will be examined in more detail in Section 2.2.1. However, in brief, the LBM study modes were encouraged in Tasmania during this period.

Finally, the period 1980 to 2000 is characterised by a return to mainstream architectural education, in line with other architecture schools within Colleges of Advanced Education and Universities (University of Tasmania 2000, p. 5). Despite these changes within the SA UTas, innovations in teaching and learning began to re-

emerge at the end of this period. One example was the renewed interest in and implementation of the LBM Studio.

2.3.1 A Radical Approach to Architectural Pedagogy: 1969-1979

Significantly, it was the transfer of the School of Architecture from the Hobart Technical School to the Tasmanian College of Advanced Education that permitted a new model to be implemented (School of Architecture, Planning and Landscape Architecture 1985, p. 17). The catalyst for change was the new Head of School, Barry McNeil. McNeil had an avid interest (and had undertaken further studies) in psychology, philosophy and education (B McNeil 2001, pers. comm., August). During the mid 1960s, architects were re-evaluating their future roles and this led to changes in architectural education. Based on his readings of various reports generated for the RAIA, RIBA and AIA (Royal Australian Institute of Architects 1967; Geddes and Spring 1967; Esher and Llewelyn-Davies 1968), McNeil made a number of critical recommendations, which included:

1. Students' education needs to be more diverse and include skills to assist future learning and adaptability; and
2. The education process should be split into two tiers. This would assist in reducing the alarmingly high rate of students not completing the six years of training.

Assisted by a Churchill Fellowship to study abroad (particularly in the United States) in 1968-1969, McNeil examined the consequences of this approach in other institutions (Tasmanian College of Advanced Education 1973, p. 2). As an outcome of this research, he developed and implemented a progressive, student-centred model of architectural education in Tasmania.

Superficially, the model presented in the School of Architecture (TCAE) handbook of 1973 was a precursor to the current one, with a two-tier framework and detailed subject program. The first tier provided a generalist design education over three years of full-time study and students completing this tier were awarded a Bachelor of Arts. They would then specialise in the second tier in the field of: Architecture, Building Operations, Urban Planning or Landscape Planning for three years part-

time study. On successful completion, a Graduate Diploma would be awarded in the specialised field (Tasmanian College of Advanced Education 1973, p. 45). The model suggested a conventional approach but in practice allowed students unprecedented freedom to shape the course to suit their interests.

A more detailed examination shows that the core of McNeil's experimental model comprised student-initiated programs, encouraging complex problem solving and learning by doing (Tasmanian College of Advanced Education 1973, pp. 18, 21, 80). In practice, this meant that the School of Architecture encouraged and supported students to select individual advisers from the academic staff. Together with their advisers, students would devise their objectives, program and criteria for self-assessment, thereby permitting a variety of learning experiences (Tasmanian College of Advanced Education 1973, pp. 91, 136). The role of the advisers was to facilitate the process and monitor the students' experiences in formal or work-study situations (Tasmanian College of Advanced Education 1973, pp. 132-133).

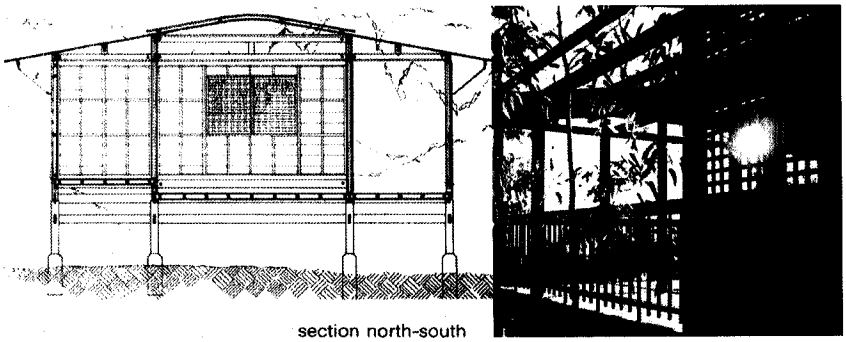
Learning programs were not confined to the Hobart campus. Students could nominate to do Work/study in a design or building related business, within or outside Tasmania. As for formal studies, students would formulate with their advisers the objectives for their Work/study and criteria for self-assessment and would complete a semester contract (Tasmanian College of Advanced Education 1973, pp. 112-115). Students were restricted only in that work-study could not occur in the first semester of each tier, as this period formally orientated the student (Tasmanian College of Advanced Education 1973, p. 114).

In addition, students could elect to devise a group program (Tasmanian College of Advanced Education 1973, pp. 111-112). Some of these programs involved 'live' workshop projects in which students designed and constructed a variety of projects from the architectural to the environmental. For example solar heating experiments, a gas digester, furniture and playground equipment were designed and constructed (Wallis et al, 2004, p. 15.3, Figure 2.1). The most recognised example was the Wombat Pavilion, which received a State RAIA Design Award in 1980. Eminent Australian architect Richard le Plastrier led this project (Tasmanian Chapter of the Royal Australian Institute of Architects 1980, Figure 2.2). These projects were made

possible by open access to a well-resourced workshop at the Mount Nelson campus in Hobart (Wallis et al, 2004, p. 15.3).

Figure 2.1: St George's Park, Hobart, Neighbourhood Park under Construction by Students, 1982

Figure 2.2: Wombat One Pavilion, in the Hobart Botanical Gardens, Royal Australian Institute of Architects' Award, 1980.



section north-south

To ensure that students would be awarded their degree or graduate diploma, students were required to complete a final Major and Professional Project (B McNeil 2001, pers. comm., August). This project would be assessed at pass or fail standard by a panel of three examiners (Tasmanian College of Advanced Education 1973, p. 125).

This structure satisfied the TCAE with regard to the awarding of degrees as well as the national accreditation body.

Initially, the RAIA National Visiting Panels supported the development of an alternative model but at the end of the 1970s their reports indicated some concerns about the process (Tasmanian College of Advanced Education 1973, pp. 12, 17; B McNeil 2001, pers. comm., August). This era ended in 1980 with the decision to relocate the School of Architecture's administration from Hobart to Launceston. McNeil resigned, as he was aware that his educational beliefs were not aligned with the TCAE administration (B McNeil 2001, pers. comm., August). On reflection, McNeil still believes in the educational principles of his model but acknowledges that at the age of 32, he did not have sufficient experience or support from the profession to maintain this radical model of architectural education (B McNeil 2001, pers. comm., August).

To appease the strong opposition from the Hobart architectural profession against the relocation of the course, the first degree in Environmental Design was offered in parallel at the Hobart and Launceston campuses (School of Architecture, Planning and Landscape Architecture 1985, p. 18)

2.3.2 The Development of the Workshop Culture

While McNeil was Head of School, the workshop was considered integral to architectural education, to the same extent as the *Design Studio*. Early in the 1980s, the new Head of School, John Webster, made the decision to close the Hobart workshop and dispose of its resources. At this stage, the new Launceston campus did not have workshop facilities (A Kelly 2002, pers. comm., March). In the early days of Webster's leadership, the workshop was not regarded as being central to architectural education (as it had been for McNeil). However, the School of Architecture gained a timber workshop through a Helsham grant provided in 1991 to introduce a Timber Architecture and Engineering course (University of Tasmania 1994, p. 4). Although the course was piloted, it did not eventuate as an identifiable component of the course (University of Tasmania 1994, pp. 6-9). Instead, the new

workshop facilities and manager became the catalyst for first year Learning-by-Making Studios (A Kelly 2002, pers. comm., March), as discussed in more detail in Section 3.3.

2.4 Architectural Education for the 21st Century

At the end of the 20th century, architectural education was significantly reviewed by institutions in the United States, the United Kingdom and Australia. Three documents arose from this process and have been critically analysed in this study. They are: *Building Community: A New Future for Architectural Education and Practice* (Boyer and Mitgang 1996); *Architecture Education for the 21st Century* (Royal Institute of British Architects, 1999); and the RAIA's *Education Policy* (2002). The purpose of this section is to gain an appreciation of the future directions which architectural education may take within Australia and how these relate to the United Kingdom and the United States, as both these countries have had considerable influence on Australia.

The first document examined was independently written and funded by the Carnegie Foundation for Advancement of Teaching. Published in 1996, *Building Community* makes seven key recommendations for architectural education and practice in the United States. This report (commonly referred to as the *Boyer Report*) represents an unprecedented level of research into the attitudes and experience of educators, administrators, students and practitioners across the United States. The *Boyer Report* was welcomed and well supported by different bodies within the architectural community. Overall, the report provides a comprehensive description of issues and problems. However, it has been criticised because it "glossed over some of the worst problems entrenched in architectural education..." such as low involvement of women within the student and staff body and the failure to incorporate practical and technical advancements (Dietsch 1996, p. 15). The report was thought to be too general and did not contribute new solutions to some well-identified problems.

The second document examined, is the RIBA's *Architecture Education for the 21st Century,* which focused on the United Kingdom (Royal Institute of British Architects

1999). It was publicly released in October 1999 and provided a necessary response to the considerable changes taking place within the construction industry. This review was originally conducted due to the unfavourable findings received from previous RIBA studies and government commissioned reports (described in more detail in Section 2.3) and consequently the recommendations are more far-reaching. For this reason, aspects of the RIBA's review are the focus of a more detailed discussion in Section 2.4.1.

The third document examined was the RAIA's *Educational Policy* (Royal Australian Institute of Architects 2002). In comparison, the context for this new policy was broad and brief. The focus was to sustain 'human life on the planet' by creative thinking and integrated solutions. Overall, the policy did not alter its directions for the future but elected to consolidate the good practices already developed. A general framework has been provided, within which schools of architecture can develop independently.

2.4.1 Influences on Architectural Education in the United Kingdom: 1990s

During the 1990s, many issues developed within and outside the RIBA that necessitated the report *Architecture Education for the 21st Century* (Royal Institute of British Architects 1999). In 1991, the RIBA commissioned the *Burton Report*, a review of architectural education and *The Strategic Study of the Profession* (Stansfield-Smith 1999, p. 1). The purpose of the *Burton Report* was to respond to questions raised by the government regarding vocational education (Stansfield-Smith 1999, p. 1). The RIBA's most recent study into the practical training of architects was the *Layton Report* of 1962 (Bradley 2000, p. 180). The *Layton Report* is also referred to frequently in this section, as many of its issues and recommendations remain current.

The *Strategic Study of the Profession* was conducted in parallel with the *Burton Report*. The negative feedback received from client focus groups surprised many architects. Overwhelmingly, clients in the study focus group were dissatisfied and felt that the profession's performance was seriously inadequate. These criticisms had

been documented anecdotally, in the *Layton Report* (1962). It is acknowledged in both reports that architectural education would play a significant role in managing change in the architectural profession and that further scrutiny was therefore required (Stansfield-Smith 1999, p. 1). Within this research, reference was made to the responsibilities of academics and practitioners to the profession: "theoretical work is best done in the schools, practical work in practice" (Carolin 1992 in Bradley 2000, p. 181).

As an outcome of the *Strategic Study of the Profession*, the RIBA chose to extend the study. *Phase 2: Clients and Architects* (1993) reconfirmed the need for the profession's existing practices and skills to be updated. Both clients and architects agreed that many members of the profession were poor communicators and did not co-operate effectively in teams (Nicol and Pilling 2000, p. 4).

Outside the RIBA, many other issues influenced *Architecture Education for the 21st Century*. These included: "...the establishment of the Architects Registration Board and the Quality Assurance Agency, the consequences of the *Dearing Report* (1997), the *Latham* (1994) and *Egan* (1998) Reports, the European directives and globalisation of architecture ..." (Stansfield-Smith 1999, p. 1).

In particular, the *Dearing Report: Higher Education in the Learning Society* (1997) and the *Egan Report: Rethinking Construction* (1998) were most influential. The *Dearing Report* reinforced that the five-year undergraduate degree course with an intermediate qualification and the postgraduate course did not assimilate with the framework of higher education. *Architectural Education for the 21st Century* attempted to resolve these problems by concentrating on the educational context in which the recommendations were being made. The implications of the *Egan Report* were limited to an education goal, but with its implementation, the 'traditional culture' of the architectural profession and education would alter.

The *Egan Report* was commissioned by the British government to investigate the under- performance of the construction industry within the United Kingdom (Egan 1998). Gaps were identified in the processes and radical recommendations proposed. In relation to the architectural profession, the gaps identified were: "the separation

between design and the rest of the project process". It was thought that "too much time and effort was spent in construction, trying to make the design work in practice" (Egan 1998, paragraph 58). Professional designers were also criticised for their inability to meet the practical needs of clients and the construction industry (Egan 1998, paragraph 55). One of the main recommendations of the *Egan Report* was the formation of partnerships between the profession and industry, to focus on the client's needs. Education and training were earmarked as the inextricable link to effect change (Egan 1998, paragraph 56). As an outcome of the *Egan Report*, teamwork was embedded firmly in the RIBA's *Architectural Education for the 21st Century*, (goal 2.3 Architecture as Interdisciplinary Activity, Royal Institute of British Architects 1999, p. 10). This goal is discussed in more detail as a common theme in all three documents, in Section 2.4.2.b.

As previously discussed, there were many different influences within and outside the RIBA that shaped *Architecture Education for the 21st Century*. Neither the *Boyer Report* nor the RAIA's *Education Policy* had to respond to immediate concerns that architectural graduates were deficient in their technical and practical knowledge; this type of feedback was minimal.

However, these concerns about the profession and its connection to the construction industry were evident in several articles reviewed in the United States and Australia (Crosbie 1995; Cuff 1996; Gutman 1996; Haysom 2001, p. 7). Most notably, Gutman states that the "architectural practice remains a troubled and beleaguered endeavour" and later describes the profession as weak. He also suggests that schools of architecture, due to their connection with universities, revolve around the humanities and place the emphasis on design. This has under-educated students and limited their knowledge of building technology and construction (Gutman 1996, pp. 87-88).

2.4.2 Common Themes in Reports on Architectural Education

In comparing the RIBA's *Architectural Education for the 21st Century*, the RAIA's *Education Policy* and the *Boyer Report*, six prevalent themes are identified:

a) Diversity;
b) Teamwork;
c) The relationship between education and practice;
d) Design and creative problem solving skills;
e) International recognition of qualifications; and
f) The justification of established professional roles.

Of these six themes, three are most relevant to this study's main focus, the LBM Studios at SA UTas:

a) Diversity;
b) Teamwork; and
c) The relationship between education and practice.

These are discussed in turn. Theme d) Design and creative problem solving skills was not examined, as this did not present new alternatives to existing methods used by schools of architecture.

a) Diversity

Diversity is a key word and a strategy recommended in the three documents examined. It is linked to many different aspects of architectural education. The *Boyer Report* states that diversity should exist in programs, application of knowledge, delivery, staff make-up, school position within the faculties and departments, research and job options (Boyer and Mitgang 1996, p. 26). The RIBA's *Architectural Education for the 21st Century* report (1999) puts particular emphasis on diversity in methods of delivery and in ensuring that the students' make-up is diverse in race and class. It is the editorial committee's belief that the diversity strategy would ensure that the architectural profession will be equipped with a broad array of skills and be able to adapt with change. A similar position on diversity is identified in the RAIA's *Education Policy* (Royal Australian Institute of Architects 2002, 5.3.4.3). Therefore, the diversity strategy supports and encourages the development of alternative delivery models such as LBM.

b) Teamwork

In principle, the documents mentioned above affirm the importance of developing teamwork skills within different groups. As discussed earlier, these recommendations were of particular importance to RIBA's *Architectural Education for the 21st Century* due to the *Egan Report.* It is stressed in the preamble to RIBA's *Architectural Education for the 21st Century,* that the tradition of the architect leading the building team is no longer a reality. However, this position did not lessen the importance of being a participant and understanding the complex relationships formed with the construction industry to 'realise the project'. To ensure positive attitudes and skills were developed, it was recommended that interdisciplinary project work be incorporated into design studio education. This would allow students to gain an appreciation of working collaboratively with other professionals, peers and clients. It was proposed that by 2002 the RIBA would establish "interdisciplinary and group exercises as a learning outcome prior to full membership of the RIBA" (Royal Institute of British Architects 1999, p. 10). Interestingly, the *Layton Report* (1962, p. 7) also put forward a strong case that students needed to gain a greater variety of experiences with other members of the building team.

However, Teamwork was not a dominant theme in either the RAIA's *Education Policy* or the *Boyer Report.* The RAIA's *Education Policy* states in its performance criteria that graduates should possess "an understanding of the processes of working within a team and how to collaborate with others in the development of a design solution" (2002, p. 7). The references in the *Boyer Report* to teamwork were more esoteric and partially linked to the theme, 'Relationship Between Education and Practice'. In two of its seven interlocking principles, the formation of partnerships between the schools of architecture, the universities and the profession was proposed to alleviate its isolation. According to the *Boyer Report,* this would better link the "schools and the profession with the changing social context" (Boyer and Mitgang 1996, pp. 26-27). These ideas were heavily borrowed from an earlier report, *The Study of Education for Environmental Design* (1967), more commonly known as the *Princeton Report* (in Boyer and Mitgang 1996, p. 21). This same study influenced McNeil's radical educational model for the School of Architecture in Tasmania during the 1970s.

In the *Boyer Report,* an interesting reference is made to an architecture education study on the east coast of the United States in 1981. Its findings suggest, "... design education can shape attitudes about clients, users of buildings and fellow architects..." (Porter 1981 in Boyer and Mitgang 1996). This point is further elaborated upon in the *Boyer Report,* with reference to the work of Professor Julian Beinhart of MIT. It suggested that architecture students held some disturbing attitudes towards working with clients. For example, some students chose to educate the client about their design solution without compromise; others beguiled the client with sneaky behaviour; only some were open to their clients' opinion. This work supports the RIBA's *Architectural Education for the 21st Century* recommendation that the focus in some students' projects should be on their relationship with the client and developing teamwork skills.

c) Relationship between Education and Practice:

According to the *Boyer Report*, the 'distinction' and 'separation' between education and practice has increased over time (Boyer and Mitgang 1996, p. 8). The report notes that in the United States, the design faculty dominated the construction faculty in 1932, and the gap between educators and the profession had grown by 1954. Bolman's preliminary research (1981) questions, "whether the methods and climate at most schools might contribute to a disdain for technical and practice-orientated topics" (in Boyer and Mitgang 1996, pp. 20-24). One promising integrative approach identified by the *Boyer Report* was the Design/build Studio (D/B), as students were involved "...in authentic projects - from the program stage through construction, and often..." included real clients (Cary 2000, p. 110).

In the 1990s, Robert Gutman and Dana Cuff explored the gap between architectural education and practice in the United States. Cuff thought that the *Boyer Report* was "uninspiring" and believed that the gap between education and practice should be "celebrated", as this allowed the future generation of architects to adapt to changes in society and the profession, as well as to fulfil new roles emerging outside of architecture (1996, p. 94).

One consequence of the division between education and practice has been the criticism of graduates for their deficient knowledge in construction and the realities

of practice. This was evident in the findings of the *Egan Report* and the *RIBA Strategic Study of the Profession* in the United Kingdom but the criticisms were then directed at the architectural profession. In the United States, there were recommendations that federal agencies should not employ architecture graduates as they were ill-prepared to work in the field (CETS 1995 in Crosbie 1995, p. 48). More recently, two key articles, which discuss this issue, have been published in Australian newspapers (Burke 2001; O'Dwyer 2001, p. 10). In response, the immediate past president of the RAIA (Ed Haysom, FRAIA) informed readers that this criticism of graduates was not a new phenomenon but a "lack of *inspirational injection* by working professionals into the Schools of Architecture" (Haysom 2001, p. 7).

In the United Kingdom, current architectural education requires learning experiences within the university and in the work place (Bradley 2000, p. 181). The *Layton Report* (1962) promoted this inclusion of practical training between the first and second course, as it would enhance students' learning in education and training (p. 9). The RIBA's latest response to the belief that professionals and graduates lacked skills in construction and practice was to suggest altering students' attitudes by making them aware that "there is dynamic equivalence between the skills needed to develop a design proposal and the skills to realise a design proposal" (Royal Institute of British Architects 1999, p. 10).

Some critics in the United States have proposed similar approaches. It is their belief that students are handicapped without some knowledge of the realities of practice (Briggs 1996; Crosbie 1995, p. 50; Freiman 1994, p. 9). Making students aware of the different skills required to develop a design proposal and to realise a design proposal, does not appear to be explicitly recommended in the *Boyer Report* or the *RAIA's Education Policy* (Royal Australian Institute of Architects 2002). In the case of the RAIA, this was a surprising outcome, as the policy was developed with complete awareness of the issues and recommendations put forward in the RIBA's *Architectural Education for the 21st Century* (H Woods 2002, pers. comm. February). At the time of this study, only six of the 21 schools of architecture in Australasia required students to gain practical experience before graduation (Royal Australian Institute of Architects 2000). However, it has since become apparent that the Union of International Architects has selected the *RAIA Education Policy* and the *AACA*

Accreditation Process on which to base its model, to recognise architecture courses across the world (L Johnson 2005, pers. comm. March).

The *Boyer Report* does not propose a solution to the concern that graduating students are ill-prepared for the office and the realities of construction. It does, however, note that the problem of integrating theory and practice at a tertiary institution was not singularly experienced by the architectural discipline. The *Boyer Report* suggests that the mission of universities' to create research, is being surpassed by an interest in applying this new knowledge in the community in that "good theory is based on good practice" (Crosbie 1995, p. 96). Therefore, in the *Boyer Report* the architectural community is encouraged to resolve this problem by increasing connections between the profession, the universities and the community, as they "hold valuable insights and lessons for all higher education" (Boyer and Mitgang 1996, p. 5).

Crosbie (1995) provides an excellent overview of the American debate to address students' perceived deficiencies, particularly in practice and construction knowledge. In his article, 'The Schools: How They're Failing the Profession (and What We Can Do About It)', he outlines a variety of existing techniques being used in some schools to remedy this problem. Reference is made to the British system of including practical work experience between the undergraduate and graduate course (Crosbie 1995, p. 94). Alternatively, some American schools of architecture operate a Work/study course: Work/study or Cooperative education involves students gaining experience in an architect's office during their course of study.

Practical experience can take the form of either block release or part-time study, with work experience as the integral part of the course (Sullivan 1996, p. 162). In 1995, the readers of the American journal *Architecture* voted that the incorporation of Work/study or Cooperative education would most improve architectural education (Crosbie 1995, p. 51). It must be noted that Work/study has inherited some of the old concerns about the pupillage system, in which students are not assured that they will gain valuable experiences, as it is highly dependent on the nature of the architect's office (Crosbie 1995, p. 94).

To mitigate the concerns related to Work/study, teaching offices were established in some schools. Many took the form of Community Design Centres (CDC), which were appended to the universities. This was a very popular strategy when introduced during the 1960s and 1970s; yet very few remain today (Crosbie 1995, p. 94). The decline in the 1980s was due to the "sharp reduction of federal support for social programs" (Pearson 2002, p. 12)

Some American educators and critics consider Design/build (D/B) Studios as a method, which provides beneficial experiences for students, enabling them to link budget, structure and construction with design (Briggs 1996, p. 77; Branch 1994; Bilello 1996). Strong similarities exist between the D/B Studios in the United States and the LBM Studios at SA UTas, and these are explored in detail in Section 3.5.

2.4.3 Issues and Recommendations Revisited

The three themes discussed above are not new, nor are the related recommendations. At best, some of the recommendations proposed in the RIBA's *Architecture Education for the 21st Century* are radical due to considerable changes in the United Kingdom. However, many of the criticisms documented in the *Strategic Study of the Profession* and the *Egan Report* are evident in the *Layton Report* (1962). This report was only partially implemented, as it was less than enthusiastically received by educators and practitioners (Bradley 2000, p. 180). It is also uncertain what impact the *Egan Report* and the RIBA's *Education for the 21st Century* will have on architectural education. Robin Nicholson (the chair of the Construction Industry Council and an eminent architect in the United Kingdom), notes in 2000 that few in the profession took serious heed of the findings from the RIBA *Strategic Study of the Profession*, 1992, 1993 and 1995 (2000, p. xv).

The *Princeton Report: The Study of Education for Environmental Design* also received little support in 1967. The seven goals from the *Boyer Report* reflect and borrow the ideals of the *Princeton Report*. In Dietsch's editorial, the same conclusion has been drawn: that the *Boyer Report* echoes previous themes identified by the AIA and others, from reports in 1932, 1954, 1967 and 1981 (Dietsch 1996). While

Gutman's work has been more radical in his recommendations for American architectural education, he also returns to past methods. He believes that students would most probably "...be educated and trained more appropriately if they spent fewer years enrolled in university schools of architecture, and instead received more of their formal education under the aegis of firms"(Gutman 1996, p. 89).

Gerald McCue of Harvard University provides an excellent summary of these issues: he notes there is "a tendency to assume that problems once identified, will necessarily be solved rationally ..." but many problems have lingered (in Boyer and Mitgang 1996, p. 26). Despite "serious concerns about the education of the architects..." the *Boyer Report* showed through its investigations that " ... schools of architecture draw at least as much praise as criticism from students, educators and practising architects" (Boyer and Mitgang 1996, p. 4). McCue states clearly educators in the field of architecture are aware of many problematic issues. Students' practical knowledge of construction or teamwork skills, for example, are often deficient, but for many different reasons the *status quo* has not changed significantly since reports in the 1960s.

2.5 Conclusions

This chapter began with an overview of the development of architectural education since the 17th century in the United Kingdom. It is evident from the literature that formal architectural education was symbiotically linked to the practices and position of the profession within society. The educational venue, type of learning and content was influenced by the campaign to establish the architectural profession and distinguish the expertise of architects from surveyors and engineers. Currently, the workshop and the model of students' gaining first-hand construction experience and knowledge is not integral to architectural education, as it was in the past. Studios such as LBM, which provide opportunities for students to design and build have a contentious relationship with the contemporary ideals of higher education, particularly in relation to the notion of practical building experience.

The second section of this chapter focuses on architectural education in Tasmania. Until the McNeil era (1969 to 1979), architectural education in Tasmania was mostly aligned with the decisions made by the RAIA Board of Architectural Education. McNeil's implementation of a radical educational model cultivated interest and confidence in student-centred projects, the role of the workshop facility and learning-by-doing. In particular, the success of the award-winning Wombat pavilion has provided on-going inspiration to staff involved in subsequent LBM Studios. The legacy of the McNeil era today is a culture of experimentation and a 'can do' attitude.

The final section broadens the focus by examining the immediate concerns faced by architectural education in the United Kingdom, the United States and Australia, in order to anticipate future directions. The findings indicate that the divide between architectural education and practice continues today. Most alarmingly, the reports from the United Kingdom indicate that clients, industry and government consider the performance of the architectural profession to be poor. In particular, communication and teamwork skills and a practical knowledge of construction and process were identified as inadequate. Similar concerns and criticisms of the profession and architectural graduates exist in the United States. To date, the debate within Australia has been minimal, but as noted, concerns are voiced intermittently.
In summary, the principle recommendations resulting from the review of the three key documents reviewing architectural education are:

a) ***Diversity***: Educators should promote diversity in the make-up of student classes and in their teaching delivery;
b) ***Teamwork:*** Architectural education should provide more interdisciplinary and team project experiences so that students are familiar with working in teams to produce architecture. These experiences will also further develop their communication and problem solving skills; and
c) ***Relationship between Education and Practice:*** The transition between education and practice was also re-examined in America, where it is thought that Work/study or Cooperative education, Teaching office or even D/B Studios may improve students' appreciation of the design process, in relation to design realisation. The *Boyer Report* suggested that architectural education

should be more connected with the professional practice, the university and the community.

Generally, the profession in Australia does not seem to be alarmed that graduates are deficient in technical or practical knowledge. In Australia, criticism of the profession and graduates has not been reported to the RAIA and the Board of Architects in such negative terms as in the United Kingdom and the United States. In addition, the RAIA *Education Policy* (2002) and AACA Accreditation Process are being examined by the Union of International Architects, as a model in the recognition of architecture courses throughout the world. This model appeals because the framework allows different approaches to develop according to local conditions and circumstances.

In the Tasmanian context, local and international students attend a small regional campus. Within the curriculum of SA UTas, the current LBM Studios offer educational opportunities sympathetic to recommendations made in the United Kingdom and the United States. The LBM Studios share similarities with American D/B programs. They have also been developed around group projects, encouraging the development of communication and team working skills. Further research is required to determine whether this type of studio assists student with their progression into the profession and the community. This is discussed briefly in Section 9.5.

Chapter 3: Learning-by-Making (LBM) Studios at the University of Tasmania

3.1 Introduction

This chapter examines the LBM model at SA UTas. The first section addresses the relationship between LBM Studios and the ideas of Experiential Learning. In the second section, the origin and development of the current LBM Studios are discussed. Finally, LBM Studios that require students to design and build at a scale of 1:1 are compared with other studios (nationally and internationally).

3.2 Experiential Learning (EL)

This section explores the link between the idea of Experiential Learning (EL) and the LBM Studios by introducing the pertinent issues and concerns associated with EL. It is important to make this link, as limited research was available on LBM studios. EL (also referred to as Experience Based Learning: EBL) is "...the process whereby knowledge is created through the transformation of experience" (Kolb 1984 in Sutherland 1997 pp. 82-83). In applying this idea to teaching and learning, the learner's analysis of experience (prior and current) through reflection, evaluation and reconstruction, is central to the learning cycle (Kolb 1984 in Andresen, 2000, p. 225). Kolb and Fry's EL model (greatly influenced by Lewin, an eminent social psychologist of the 1950s) is the model most widely referred to and adapted in this field (Figure 3.1 in Sutherland 1997, p. 85).

In many cases, the application of EL incorporates group work, as both Lewin and Vygotsky have identified the learning benefit of discussing ideas with others. In particular, Lewin found that group work forces members to reassess their established frameworks of developing knowledge, problem solving and personal beliefs. As each

member has a different perspective and approach, the challenge can create "a learning environment ... with remarkable vitality and creativity" (Kolb 1984, p. 10).

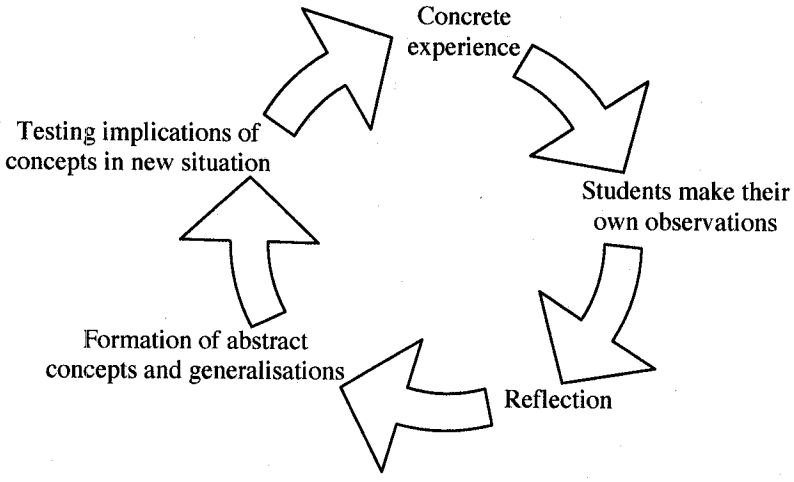


Figure 3.1: Kolb and Fry's (1975) EL model (in Sutherland, 1997, p. 85)

The ideas of EL have not changed since Kolb's work (1984), but its application to teaching and learning has evolved in many directions; the three main ones being:

1. **Intentional design** –students are given a planned learning event(s) or design their own;
2. **Facilitation** – the level of support and interaction lecturers provide to students; and
3. **Assessment of learning outcomes** – according to EL ideas, the process should be assessed not the outcomes (Andresen, Boud et al. 2000, pp. 226-227).

The incorporation of EL into a teaching style is commonly known as 'andragogy' (Knowles, 1984 and Kolb 1984). Andragogy is distinct from the pedagogy of instructing knowledge and ignoring learners' experiences (Sutherland 1997, p. 85). EL and andragogy were developed in reaction to overly didactic teaching styles. Today EL is predominantly employed in vocational and professional education (Andresen, Boud et al. 2000, p. 233). Here, students construct or reconstruct their knowledge through practical experience in the work place or in a simulated work place.

EL became an attractive teaching theory in the 1960s (with the recognition of Piaget's work on cognitive development processes), but it has always been contentious: ancient Greek philosophers debated the connection of experience to knowledge creation (Andresen, Boud et al. 2000, p. 229). Typically, concerns have been associated with the process and its application, in terms of:

1. The **learner negotiating his or her own curricula**. Many educators have differing opinions as to whether young adults (in this case, participants in LBM Studios) have the ability to learn by the process of EL. This may for example depend on their current learning approach, either dependent or self-directed (Andresen, Boud et al. 2000, p. 236).
2. **Learners should be consciously aware** of what he or she is trying to achieve as this method differs from conventional classroom teaching (Sutherland 1997, p. 89).
3. The **learner's ability to generalise principles** from their experiences and to apply them to future inquiries (Coleman 1976 in Sutherland, 1997, p. 86);
4. The **inter-personal skills of the facilitator** to monitor and assist work experiences without inhibiting or determining the process for learners (Andresen, Boud et al. 2000, p. 236);
5. The **assessment procedures** are focused, generally on the process and not the outcomes, which cause concern for both teacher and learner due to uncertainty and unpredictability (Andresen, Boud et al. 2000, p. 235). According to Kolb, defining "... learning in terms of outcomes can become a definition of non-learning..." because if ideas can be fixed and measured, then it is not EL (Kolb 1984, p. 26). Kolb supports his own argument by citing Bruner (1966): "...the purpose of education is to stimulate inquiry and skill in the process of knowledge getting, not to memorise a body of knowledge..."(in Kolb 1984, p. 27).
6. A recent study of **group work** (sometimes included with EL models) in tertiary education suggests that some group members may 'socially loaf' as it is difficult for them to identify their contributions within the group (Williams 2001 in Morris 2001). In addition, the chief concern of students (working in group activities) is the potential for **unfair assessment** (Morris 2001).

These concerns are all particularly pertinent to the investigation of the LBM model as described in detail in Section 3.3 and 3.4. Kolb concludes that EL offers a process for lifelong learning as it is soundly based in the intellectual traditions of social psychology, philosophy and cognitive psychology (Kolb 1984, p. 11).

3.3 The Origin and Development of LBM

The origins of the current SA UTas LBM model lie with an experiment conducted in 1994. First year co-ordinator Ian Clayton and workshop manager Robin Green were interested to know if first year students could successfully design and build a small project. They invited Bud Brannigan (an award-winning Brisbane architect) to join the teaching team. Each team member shared interests in design, making and teaching (Green 1998, p. 63). Their first attempt resulted in a toolshed made out of recycled timber from the workshop bins (Figure 3.2). In subsequent workshop sessions, the team observed that "...the same students ...demonstrated a unique ability to design with an understanding of how it could be made and where design changes are likely to be necessary" (Clayton, Brannigan et al. 1997, p. 31).

Figure 3.2: Robin's Shed, LBM Studio 1994

From the outset of this project, two guiding principles were derived from the team's previous experiences. These principles later became the underlying structure of the developing LBM model. The first principle acknowledged the belief that students need some appreciation of the processes involved in making projects, as when

construction is not considered integral to the design process complications abound. In effect, the student's design will not be as limited by construction if the student incorporates and researches construction ideas into the design process. Typically, in schools of architecture, design and construction are taught in separate units, with limited overlap between the two. The second principle supported collaborative learning (Green 1998, pp. 63, 66). An educational environment was set-up in the School Workshop so students would feel supported by the lecturers and free to discover and test many ideas. Through trial and error, these principles were extended and translated into a teaching approach. Both of these principles display a strong connection between the premise of EL and LBM.

By the end of 2003, LBM has become an established teaching model within the SA UTas. Over a decade, at least 45 LBM Studios have been held (Table 3.1). Projects include playgrounds, resting points in sensitive wilderness environments, stage sets, a greenhouse, bicycle racks, a mud-brick dome, a composting toilet block, an outdoor theatre, bus stop shelters, landmark furniture for the School of Architecture courtyard and educational objects (Figures 3.3). A significant number of these projects have been built for community groups in Tasmania.

These projects have been carried out with modest budgets. For example, in 1998 the average cost of a typical LBM project was $3000 to $5000 (Wallis et al. 2002). This situation has been made achievable through industry and client donations. In most cases, donations are made 'in kind' for building materials or services. The Workshop's budget pays for the basic consumables (Green and Webster 1998, p. 64). In effect, these constraints have meant that the availability of materials defines the budget and the scale of the project (Green and Parnell 2001).

The palette of materials used in LBM projects has generally consisted of "sawn timber, plywood, corrugated steel, acrylic paint, transparent wood finishes and minimum use of metal brackets and concrete for footings" (Green and Parnell 2001). Until now, timber construction has prevailed due to its local availability and ease of working. The predominance of traditional technology has generally restricted its application to students in first, second and third year. Matthew Parnell (1999 to 2002) initiated LBM Studios that focused on the application of Environmentally

Sustainable Design (ESD) and its construction methods, for example mud-brick and straw-bale construction (Figure 3.4). Unfortunately, these explorations into alternative construction materials have not been investigated in LBM studios, since Parnell's departure.

Figure 3.3: LBM Projects: (*clockwise from top left*) Greenhouse 1994, Rainbow Thrones 2001 and Grollo Tower 1999 in the SA Utas Courtyard, Garden Shed 2003, Bus Stops 2 2001 and Freycinet Furniture 2

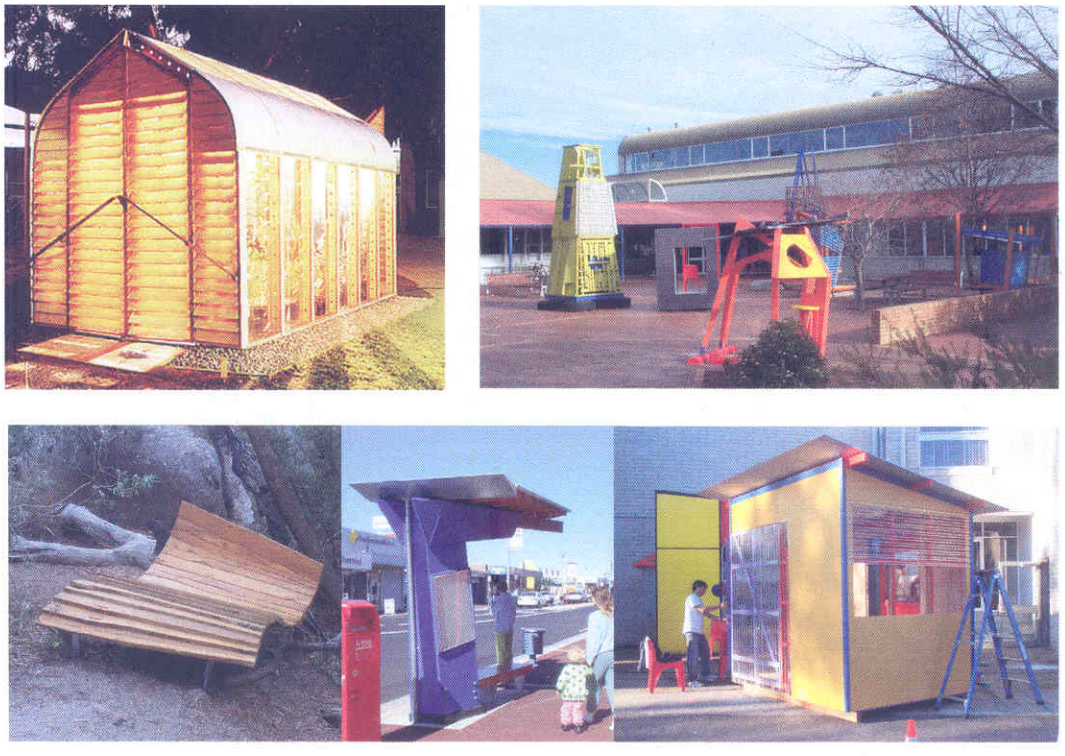


Figure 3.4: LBM Projects: Mud-brick Dome 2000

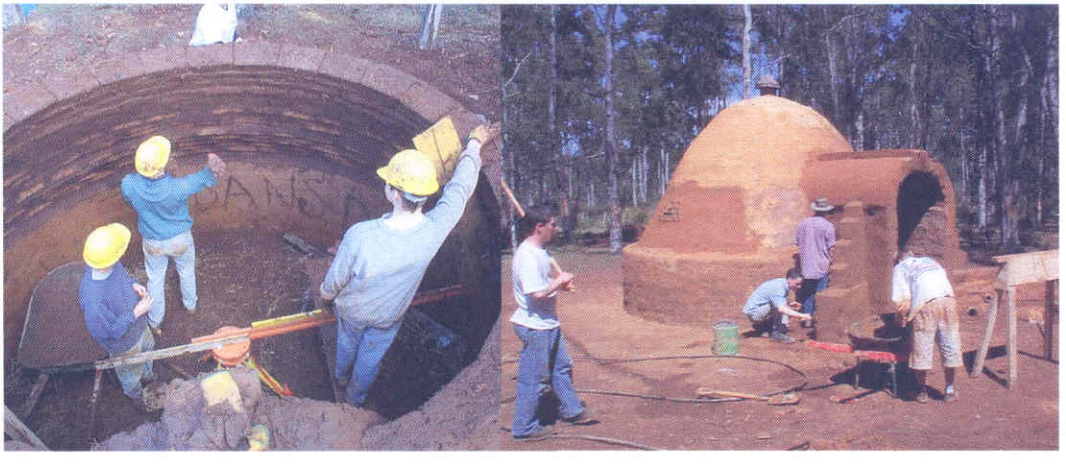


Table 3.1: LBM Projects (1994-2003)

	Project Name	Year	Semester	Subject	Staff	Description	Client
1	Stepping Out	1994	1	E	IC, RG	Stage set design	Earl St. Arts
2	Greenhouse	1994	2	E	JB, RG	Greenhouse "kit"	SA UTas
3	Robin's Shed	1994	2	D1	IC, BB, RG	Exp. Shed	SA UTas
4	Kids Fast Train	1995	1	E	PS, SS	Playground: train	
5	Greenhouse Details	1995	1	E	JB, RG	Timber door furniture	SA UTas
6	Crazy Timber Furniture	1995	2	E	IC, RG	Timber furniture	Student
7	Holly Hut 1	1995	2	E	JW, GN, PY, JB, RG	Exp. timber pavilion	SA UTas
8	Blue Spikey Thing	1995	W	E	PY, RG	Exp. timber structure	SA UTas
9	Tamar Island	1996	1	D1	IC, GVS, RG, BB, PY	Entry shelter and seat	Parks & Wildlife Services
10	Waterworks Pavilion	1996	2	E	SS, RG	Pavilion	
11	Cradle Bike Racks	1996	2	D1	GVS, TW, RG	Bike rack seat/ shelter	Cradle Mountain N.P.
12	Holly Hut 2	1996	2	E	GN, JW, RG	Pavilion	SA UTas
13	Flying Duck Seat	1997	1	D5	RB, RS, RG	Shelter with tables/seats	Campbell Town High SA UTas
14	Rave Shade & Play	1997	1	D1	IC, GVS, RG	Playground	
15	Courtyard Gateway	1997	1	E	GN, RG	Exp. structure	SA UTas
16	Missiondale	1997	2	D1	GVS, RG	BBQ shelter	City Mission
17	Musical Playground	1998	1	D1	IC, GVS, CP, JA, RG, DH, CR	Playground	St Georges Special SA UTas
18	Crazy Wood Structures	1998	1	E	GN	Exp. use - plantation pine	SA UTas
19	Freycinet Theatre + Toilet	1998	2	D1	IC, GVS, RG	Outdoor theatre and toilet shelter	Freycinet N.P.
20	Turners Beach 1	1999	1	D1	IC, LW, KT, MB, RG	Viewing platforms/ seats	Turners Beach
21	Grollo Tower	1999	1	E	IC, RG, PY	Exp. timber tower	SA UTas
22	Turners Beach 2	1999	2	D1	IC, GVS, RG	Beach changing shed	Turners Beach
23	Golconda Circus Rig	1999	2	E	IC, MB, RG	Timber circus rig	Golconda Circus Festival
24	University Bus Stops	1999	s	SS	IC, GVS, RG	Timber bus shelters	UTas
25	Westbury Stage	2000	1	E	IC, RG	Demountable timber stage and park seats	Meander Valley Council
26	Mud-brick Dome	2000	1/ 2	E	MP, RG	Exp. mud-brick dome	SA UTas
27	Deloraine Playground	2000	1	E	IC, GVS, RG	Playground	Deloraine Primary SA UTas
28	Freycinet Furniture	2000	2	E	GVS, RG	Outdoor seats	Freycinet N.P.
29	Theatrical Play	2000	2	E	IC, RG	Stage set	UTas: Arts
30	Bus Stops 2	2001	S	SS	IC, GVS, PY, RG, CP, JS, JH, MS, LW	Community bus shelters	Launceston City Council
31	Flat-pack Furniture	2001	1	E	GF, BG, RG	Exp. timber, flat-pack furniture	Student
32	Mt Arthur Wall	2001	1	E	MP	Straw-bale wall prototype	Mt Arthur
33	Chess Pieces	2001	1	E	JH, RG	Prototype chess pieces: snap-lock	Students
34	Rainbow Thrones	2001	2	D2	IC, JMc, RG	Exp. shelters with fixed seats	SA UTas

	Project Name	Year	Semester	Subject	Staff	Description	Client
35	Styx Valley +Les Miserable	2001	2	E	IC, JMc, RG	Outdoor seats and viewing platforms + stage set	Forestry Tasmania, + Theatre North
36	Lulu Lounge + QVM	2002	1	E	IC, RG, LW	Internet café on wheels + reception counter	SA UTas, QVM
37	Theoretical Screens	2002	2	TD	RBl, PD, LW, RG	Verandah screen incorporating theories	Students
38	Home Point	2002	S	E	IC, RG	Interpretative shelter and seats	Launceston City Council
39	Bus Stops 3	2003	S	SS	IC, RG, JH, MS, LW, JL	Community bus shelters	Launceston City Council
40	Lanterns	2003	1	D1	CMc, LW, CR, FR, SF, RG, JL	Large floating lanterns in the Gorge	Students
41	Garden Shed	2003	1	E	LW, RG, IC, JL	Garden shed	Student Association (UTas)
42	Exp. Space Frame	2003	2	D3	IC, JBe, PD, RG	MDF snap-lock space frames	Students
43	Shack Pieces	2003	2	D1	CMc, LW, CR, FR, SF, RG	MDF snap-lock table ornaments	Students
44	Theoretical Screens 2	2003	2	TD	RB, LW, RG	Verandah screen incorporating theories	Students
45	Stompin' Youth	2003	2	E	IC, RG, JL	Exp. office pod	Stompin' Youth Dance Company

Abbreviations: E – elective, D1 – design 1st yr, SS – summer school, TD – Theory in Design (4th yr), Exp – experimental, N.P. – National Parks, UTas – University of Tasmania, SA UTas – School of Architecture at University of Tasmania, QVM – Queen Victoria Museum.

Staff Initials: See Appendix 3.1; several staff members are referred to in this chapter.

Data : sourced from LBM unit outlines and conference papers as listed in Appendix 3.2

Much experimentation has occurred with the LBM model by various lecturers in different year levels and units (see Table 3.1). Between the years 2001 and 2003, LBM has developed in two different directions:

1. Project briefs have become more complicated and demanding, with the introduction of larger community clients, public projects/sites, and larger budgets ($20,000)
2. Four-day, small design-build projects such as floating lanterns, experimental space frames and theoretical screens have evolved within *Design Studios* (first and third year), *Building Technology* (first and third year) and *Theory in*

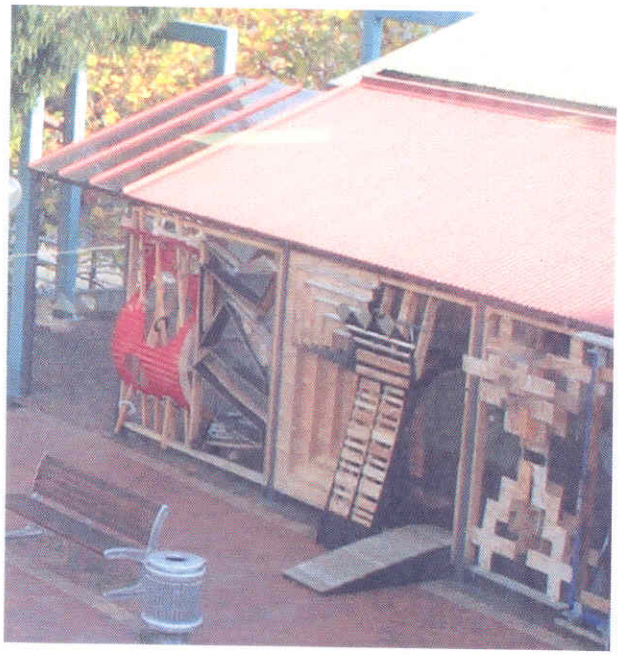
design a shelter that will be protected "from south westerlies winds, provides shade from 10am to 3pm ..." and provides seating for 2 to 10 students (Green, Clayton et al. 1999, pp. 9-10). In terms of EL, the LBM brief provides an intentional design (the facilitator has devised the brief to which the students respond).

Students are deliberately put in groups so they can gain an appreciation of the collaborative design process and further develop team-working skills. "Group design exercises lead to an intense design debate and exchange of ideas" (University of Tasmania 2000, p. 7): another observation that is supported by EL, but also includes the concerns about student experiences within a group structure. In addition, the use of the group structure in LBM ensures that the students involved feel a sense of ownership and commitment to the final design as "...opposed to a range of competing individual solutions" (Clayton, Burnham et al. 1998, p. 342).

The staff for LBM projects present themselves as role models and facilitators. As role models, they demonstrate and foster teamwork practices by endeavouring to consult and collaborate with colleagues and students. In a similar manner, they demonstrate their commitment to the project and are present at all times. "The success of these projects is almost entirely dependent on students being as committed as the teaching team" (Green, Clayton et al. 1999, p. 9). According to Green, these roles are not always easy to fulfil (Green, Clayton et al. 1999, p. 10). As facilitators, the role of teaching staff is to respond to questions, promote team discussions, encourage introverted team members, mediate conflicts by reminding them of the process to trust in the design of others and keep morale high (Green, Clayton et al. 1997, pp. 71-72) (Green and Parnell 2001). It has been identified as important that staff do not lead the design process so that "... students are stimulated by each other's thoughts and ideas..."(University of Tasmania 2000, p. 7). Rather, the emphasis for staff has been placed on identifying whether the students' design proposals are developed to a level that they may be constructed (Green and Parnell 2001). According to Kolb (EL), the facilitation role taken on by lecturers and support staff allowing the students to determine the solution creates meaningful learning (Kolb, 1984 p. 11).

Design (fourth year) (Figure 3.5). These LBM Studios explore and support knowledge being examined in *Design Studios, Theory in Design* and *Building Technology*. These variations are addressing the need to enhance students' understanding of the relationship between design and construction by incorporating LBM experiences in a range of compulsory units throughout the curriculum.

Figure 3.5: LBM Projects: Theoretical Screens 2002 and Floating Lanterns 2003



3.4 The LBM Model

As indicated, there are currently two distinct LBM models. For the purposes of this study, the first LBM model (involving large community projects) is examined as it has been in operation longer than the second model. In addition, the second model has borrowed many aspects from the first.

Typically, the LBM studio operates as an intense 15-day program, or as one day per week for the 15 week semester. Before the project begins, the lecturer and workshop manger meet with the client to determine the latter's needs and to devise a brief. This brief ensures that the client, students and staff share the same expectations. The brief clearly outlines the performance requirements that are to be met: for example, to

design a shelter that will be protected "from south westerlies winds, provides shade from 10am to 3pm ..." and provides seating for 2 to 10 students (Green, Clayton et al. 1999, pp. 9-10). In terms of EL, the LBM brief provides an intentional design (the facilitator has devised the brief to which the students respond).

Students are deliberately put in groups so they can gain an appreciation of the collaborative design process and further develop team-working skills. "Group design exercises lead to an intense design debate and exchange of ideas" (University of Tasmania 2000, p. 7): another observation that is supported by EL, but also includes the concerns about student experiences within a group structure. In addition, the use of the group structure in LBM ensures that the students involved feel a sense of ownership and commitment to the final design as "...opposed to a range of competing individual solutions" (Clayton, Burnham et al. 1998, p. 342).

The staff for LBM projects present themselves as role models and facilitators. As role models, they demonstrate and foster teamwork practices by endeavouring to consult and collaborate with colleagues and students. In a similar manner, they demonstrate their commitment to the project and are present at all times. "The success of these projects is almost entirely dependent on students being as committed as the teaching team" (Green, Clayton et al. 1999, p. 9). According to Green, these roles are not always easy to fulfil (Green, Clayton et al. 1999, p. 10). As facilitators, the role of teaching staff is to respond to questions, promote team discussions, encourage introverted team members, mediate conflicts by reminding them of the process to trust in the design of others and keep morale high (Green, Clayton et al. 1997, pp. 71-72) (Green and Parnell 2001). It has been identified as important that staff do not lead the design process so that "... students are stimulated by each other's thoughts and ideas..."(University of Tasmania 2000, p. 7). Rather, the emphasis for staff has been placed on identifying whether the students' design proposals are developed to a level that they may be constructed (Green and Parnell 2001). According to Kolb (EL), the facilitation role taken on by lecturers and support staff allowing the students to determine the solution creates meaningful learning (Kolb, 1984 p. 11).

Design exploration in the LBM Studio is through model making. Drawing is generally not permitted. It is believed that models greatly assist the students in exploring relationships between structure and form. Group members quickly understand each other as the problem of making and interpreting drawings is removed (Green, Clayton et al. 1999, p. 10). Ideas from different groups can then be tested and discussed, as models are at the same scale (Green, Clayton et al. 1997, p. 70). Usually the lecturer requires the students to make a series of models to refine their design. The first models are generally made at a scale of 1:10. The focus or the scale of the model is gradually increased, creating a higher level of resolution. About half way through this process, students are given a limited amount of model making materials, which represents their budget. It is important that the model making processes are conducted at an intense pace to ensure "that very few ideas [are] irrationally defended" and enthusiasm is maintained (Green, Clayton et al. 1997, p. 71).

Figure 3.6: Bus Stops 2 Model Making

This model-making process was well described by Clayton, Green, van der Schans and Brannigan:

> *The initial models represented elaborate and overly complex buildings. At this stage many ideas were being bundled together. The amount of materials, their individual qualities as experienced by hands on testing, and the amount of constructional time was continually emphasised. This liberated the design and led to refinement of initial responses. During these early stages students were becoming more aware that they were going to need basic technological information to continue* (1997, p. 70).

Literature uncovered from the 1930s supports the use of model making in architectural education. According to Nelson, there are advantages in using models

instead of a reliance on drawings, as students tend to forget what is being represented (in Landgon, 1995). This point is made by Kaji-O'Grady more recently, "it is important to be aware how different modes of representation lead to different ways of seeing and thus contradictory thinking" (2000, p. 24).

The students' educational experiences were broadened with the advent of community projects in 1996 (Green, Clayton et al. 1997, p. 69). Importantly, this addition has meant that the ambiguous role of the lecturer as critic/educator and client has been removed, as 'real' groups fulfil the role of client. The construction of the project cannot be started until the client has granted approval. In the case that a client does not exist, the workshop manager takes this role (Green, Clayton et al. 1999, p. 10). As a result, students' communication skills and their ability to discuss design with those outside the School of Architecture are further developed. Students may also gain new experiences with local tradespeople, structural engineers and experienced architects depending on the project requirements. An engineer provides advice to students on their conceptual and final design models (Green, Clayton et al. 1999, p. 10). In the case of an architectural consultant, students have closely observed, for example Bud Brannigan's skill in resolving design details (Green, Clayton et al. 1997, p. 71).

Most projects are prefabricated in the School's Workshop, ready to be transported to the site. During the construction phase, students learn to use a variety of tools and improve their construction vocabulary. Students are given individual instruction on the use of equipment and tools. Even though a policy of trust is established, the machine room is constantly supervised. Once again, it is the belief of Clayton and Green that "...the level of trust encouraged all students to be highly involved" (Clayton, Brannigan et al. 1997, p. 31).

Figure 3.7: Bus Stops 3 2003

In this process of learning about tools, students experience first hand the limitations of specific materials and more importantly their design details. Up to this phase,

students mostly believe that their design has been fully resolved and tested. Generally, this is not the case and the students gradually begin to appreciate many of the issues that may be overlooked when designing but which are now critical in the construction phase. This is an example of the EL process in which students reflect on their experience and realise the implications of certain decisions. Students often state: "I didn't realise that it would be so big" (Green, Clayton et al. 1997, p. 71).

Traditional documentation of the projects after completion has been attempted but generally not adopted for two reasons. First, the time commitments demanded by LBM projects are already substantial without this additional workload. Second, there has been mixed results of success in students producing measured drawings; some students did not demonstrate a sound understanding of construction (Wallis et al. 2002). This was the case in Robin's Shed even though it was noted that students had individually improved their architectural drawing skills (Clayton 1995, p. 134). In the documentation of the Tamar Island project, it was observed that "this exercise associated the student's workshop experience to drawing conventions" but it did not discuss whether this improved students knowledge to apply to other units (Green, Clayton et al. 1997, p. 72). The process of drawing a completed LBM project provides another opportunity for students to reflect on their learning and establish additional cognitive links between design and construction.

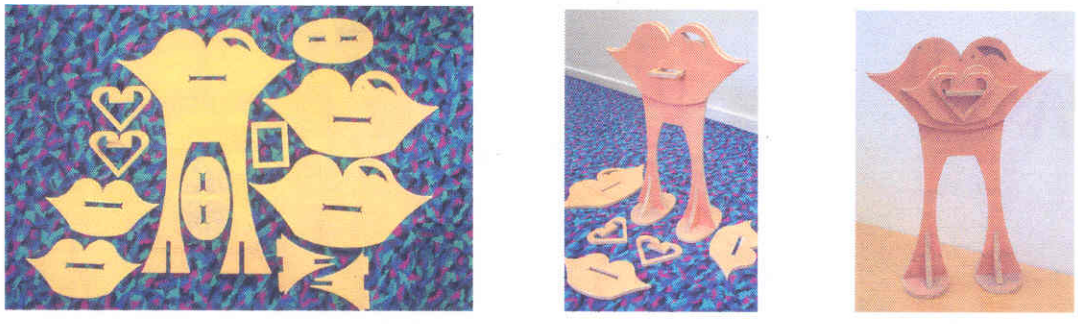
In 1996, Computer Aided Drafting (CAD) modelling was introduced by involving fifth year students in a LBM project (Green, Clayton et al. 1999, p. 10). The potential for CAD modelling in LBM was further expanded with the acquisition of the CNC flatbed router in 1998. A new alliance between the School Workshop and the Computer Studio was formed (University of Tasmania 2000, p. 31). The CNC flatbed router allowed the exploration of computer aided manufacturing and repetitive fabrications (J Hall 2002, pers. comm., June).

As a result, the Computer Use in Design (CUD) lecturer, John Hall, instigated another LBM model. Students tested their abilities to design and document with CAD by using the CNC flatbed router. The CNC flatbed router reads and executes the CAD drawing. Through the assemblage of the cut components, students learned and reflected on their process and its level of success (Wallis 2001, p. 10). This

model created an objective and arbitrary assessment for the student without the input of the lecturer. The student quickly realises that their design did not consider the process of assemblage thoroughly or the CAD drawing was inaccurate as construction difficulties were experienced (Wallis et al. 2002).

Figure 3.8: CNC Flatbed Router

Figure 3.9: LBM Project: Chess Pieces 2000 (designed in CAD, cut out by CNC Flatbed Router and Assembled by Students Without Glue or Fittings)



During these developments, Hall also developed specialist software such as SketchPAD and more recently iMill for Apple computers, to make it easier to draw and cut objects out with CNC flatbed router. Both have improved the link between the virtual design in the CUD Studio and its production in the School Workshop using the CNC technology. High quality computer graphics and computer-manufactured models have become a normal part of a student's presentation repertoire (Wallis et al. 2002). The CNC flatbed router has also become a popular tool for all LBM Studios, as it saves time when cutting repetitive components and

improves students' level of 'craftsmanship' (Wallis 2001). This alternative LBM model is beyond the scope of this study.

3.5 International Review of Studios Similar to LBM

Over 20 years ago, a search for literature on D/B Studios by Bob Fowles (at the Welsh School of Architecture) provided limited results. His search of the RIBA periodical index from 1977 to 1983 indicated that eight schools of architecture in the world had published information on their D/B projects (Table 3.2). At this time, Fowles questioned whether his search truly indicated the "extent of the activity or is it simply that those who do, don't write?" (1983, p. 8).

Table 3.2 Fowles' (1983) list of Schools of Architecture Running D/B Studios: 1977 to 1983

No.	Country	University	Current Practice
1	United Kingdom	Portsmouth Polytechnic School of Architecture	
2-3		Liverpool and Nottingham Universities (Combined project)	
4		Welsh School of Architecture	
5	United States of America	University of California	
6		Yale School of Architecture	*
7	Germany	University of Stuttgart	
8	New Zealand	Victoria University School of Architecture	

The literature review for this thesis confirms Fowles' hypothesis. Those involved in D/B projects were more concerned with the 'doing' than the writing and academic debate to date has been minimal. Nevertheless, it was a surprise to find Auburn University's Rural Studio and the University of Washington's Mexico Studio have received international publicity and accolades in architectural journals and other media. American records suggest that D/B Studios started as early as 1922 (University of Oregon) and 1966 (Yale University) (Badanes 2001 and University of Oregon 2002). In addition, the *Boyer Report* in 1996, indicated that D/B Studios may improve the construction and practice knowledge of architecture students.

Over the period of this study (2000-2004), few books describing the D/B Studios and aspects of them such as educational goals and benefits were found. Most were published towards the end of this study, suggesting that interest is rising, particularly in the United States. The primary text at the beginning of this study was Bill Carpenter's *Learning by Building* (1997), which presents case studies from a number of schools of architecture in the United States. Contributing authors outline the D/B Studio objectives, programs, type of projects and feedback. However, the level of detail provided by the different D/B Studios varies making it difficult to compare the Studios. Further information was gained through contact, during this study, with the various contributing authors and schools of architecture cited.

Other monographs that provide more insight into American D/B Studios are *Rural Studio: Samuel Mockbeee and an Architecture of Decency* (Oppenheimer Dean 2001) and *University-Community Design Partnerships* (Pearson 2002). The authors of these monographs are not connected with D/B Studio education. *Rural Studio* details and documents the D/B projects that students at Auburn University have designed and built for the community of Newbern, Alabama, over the last decade. It is a very inspiring publication with many large colour photographs illustrating the innovative use of materials and the wonderful spatial qualities achieved in private residences and community facilities designed and constructed for low-income people. The essay at the beginning of the publication highlights the motivation and drive of Samuel Mockbee, the founder of these Studios. While not providing a 'how to do' section or a critique of the educational benefits the book does give a sense of the commitment to and contribution of Auburn University and its students to D/B Studios.

University-Community Design Partnerships is based on "the conviction that [design] innovation is inseparable from social engagement, and thus inseparable from public service" (Pearson 2002, p5). Pearson puts forward the concept of D/B Studios and Community Design Centres (CDCs) being adopted nationally into schools of architecture in the United States (Pearson 2002, p. 8). After the *Boyer Report* (1996), interest in D/B Studios and CDCs providing affordable design services to local communities increased (Pearson 2002, p. 11). By 2001, there were 11 dedicated D/B Studios and 48 CDCs (Pearson 2002, pp. 16-17). Both models are considered

'service learning', which has been encouraged by the American Association of Higher Education. 'Service learning' enhances "students' understanding of academic material by offering them an opportunity to apply new approaches to concrete social and environmental challenges, while simultaneously encouraging active participation in public life" (Pearson 2002, p. 13).

Other useful sources of information are *The ASCA Sourcebook of Community Design Programs* (Cary 2000) and the February 2002 issue of the *Journal of Architecture* (JAE), which features articles on D/B Studios in North America and a specifically related conference. In the conference article, 'Designing/Building/Learning' the authors expressed surprise that D/B Studios "continue to resist theorising and critical discourse" (Erdman and Weddle 2002, p. 175). "Key questions, such as: What is the place of design-build in the curriculum? How do design-build projects make our students better architects? What is the meaning by building?" were not addressed at the conference (Erdman and Weddle 2002, p. 174). In a powerful conclusion, Erdman and Weddle succinctly identify many of the problems associated with D/B Studios and its inclusion into architectural education:

> *It is also extremely difficult to discuss these projects, because evidence of success is often anecdotal, and is framed in terms of student empowerment, skill-building, or community and social agendas. Too often, their benefits are seen as self evident and in no need of critical examination, privileging the irrefutable power of activity over the more reflective act of theory. Typical theoretical investigations address the products of a process and not the process itself* (2002, p. 175).

This literature review of LBM Studios at UTas and other research on D/B Studios concurs with these conclusions. Neither of the conference organisers who wrote this article, appear to be connected with D/B Studio teaching.

So far, the majority of the literature discussed has originated in North American schools of architecture, although there are other scattered examples. For example, the Catholic University of Valparaiso in Chile has been designing and building a community at Ritoque for students of architecture, art and engineering. The primary purpose is to allow students the opportunity to design and build projects collaboratively, inspired by the poetics of the beach site (Pendleton-Jullian 1996).

The beach site is known as the Open City of Ritoque as each year students add to the collection of buildings, instigating a new theory towards town planning. Again, the book written about the Open City of Ritoque informs the reader about the projects and motivation behind its foundation, but provides few details regarding the program or educational objectives. The author, Pendleton-Jullian, is more concerned by the design process and the conception of ideas. Pendleton-Julian is an Associate Professor of Architecture at MIT and does not appear to be involved with D/B Studios in the United States.

Since 1994, the Prince of Wales Institute of Architecture in the United Kingdom has promoted its building project (which students complete in their first year of study) in its prospectus and website. However, its course in architecture closed in 2001. The Prince of Wales Institute of Architecture was heavily influenced by Crinson and Lubbock's views on architectural education (both are cited in Appendix 2.1 regarding the debate on whether architecture is an art or a profession, which influenced the form of architectural education in the university system).

As no significant literature was located outside North America, a survey commenced in June 2002 to address this shortcoming. An email was sent to 114 schools of architecture worldwide, asking if they offered studios where students designed and built projects at a scale of 1:1. From the 114 emails sent, 30 responses were received, which identified a further 21 schools of architecture (Appendix 3.3). This method (combined with the literature) indicated that there were at least 59 schools of architecture across the world providing LBM or D/B Studios (Table 3.3). This does not represent the complete number but it is an indication of where this teaching and learning practice has occurred over the past decade. However this method of emailing and checking websites did not reveal further literature.

It is worth noting that prior to the email survey, no references had been recently cited in Australasian schools of architecture. The Literature indicated that the practice did exist. For example, architecture students in New Zealand designed and built 'The Demonstration House' in Wellington in the summer of 1948-1949. This was an initiative driven by the concerns that New Zealand houses were badly designed and architectural education was conservative and limited in its scope (Gatley 1996, p. 89).

Table 3.3: Evidence of Architecture Schools Providing D/B Studios at the Scale of 1:1 (in 2002)

Australasia	Australia New Zealand	1. University of Tasmania 2. Newcastle University 3. Curtin University 4. University of South Australia 5. University of New South Wales 6. UNITEC University of Technology, Auckland
North America	US Canada	7. Auburn University 8. University of Michigan 9. Yale University 10. Cranbrook Academy of Art 11. University of Washington 12. University of Kansas 13. University of Illinois 14. Temple University 15. Drury University 16. Southern Polytechnic State University 17. University of Oklahoma 18. University of Arizona 19. University of Oregon 20. Dalhousie University 21. Carleton University 22. Catholic University of America 23. University of Arkansas 24. Miami University 25. University of Colorado at Boulder* 26. University of Virginia* 27. University of Maryland* 28. Virginia Polytechnic Institute* 29. University of Puerto Rico* 30. University of Texas – Austin* 31. Tuskegee University* 32. Carnegie Mellon University* 33. University of North Carolina at Charlotte* 34. University of Houston 35. Clemson University# 36. Rice University 37. Woodbury University 38. Ball State University 39. University of Tennessee# 40. Washington State University 41. University of Idaho 42. Montana State University
Europe	England France Germany Finland Slovak Republic	43. Prince of Wales Institute of Architecture 44. University of Manchester & Manchester Metropolitan University 45. TU Dresden 46. University of Oulu 47. Helsinki University of Technology 48. Slovak University of Technology 49. Brandenburgischen Technischen Universitat Cottbus 50. University of Applied Sciences in Munich Grands Atelier de l'Isle d'Abeau, Centre for teaching, researching and experimentation in the field of construction, near Lyon, France. A resource for: 51. Ecole d'architecture de Saint-Etienne 52. Ecole d'architecture de Paris-Villemin 53. Ecole d'architecture de Lyon 54. Ecole d'architecture Languedoc-Roussillon 55. Ecole d'architecture de Grenoble 56. Ecole d'architecture de Clermont-Ferrand
South America	Chile	57. Catholic University of Valparaiso
Africa	Ghana South Africa	58. Kwame Nkrumah University of Science and Technology, Kumasi 59. Witwatersrand University

* Entrant in the 2002 Solar Decathlon

reference found from the early 1990s, uncertain whether this is still in occurrence.

In 1949, at the first Head of Schools of Architecture meeting, there were divided opinions as to the advantages accrued from 'playing' with building technique (Laybourne-Smith 1949, pp. 132-133).

In the 1960s and 1970s, it was popular in Australia to include 'building experience' as part of an architectural education (for example, at the schools of architecture at the University of Queensland, Queensland University of Technology, University of Tasmania, Royal Melbourne Institute of Technology and University of Melbourne (J Hutchinson and D Nutter 2002, pers. comm., June)). By September 2002, the University of Tasmania and University of South Australia were the only schools in Australia or New Zealand regularly involved in the designing and building of small projects. There is some evidence that small experiments were also being undertaken at Curtin University, University of Newcastle, University of New South Wales and the University of Technology, Auckland (G Cowan, J Roberts, D Morris, and J Treadwell 2002, pers. comm., June – September).

As the detail of information identified on D/B and LBM Studios at the 58 schools of architecture varied, only 17 of these were analysed in detail.

3.5.1 Main Characteristics of LBM and D/B Studios

Of the 17 schools of architecture examined (Table 3.4), 15 are in North America and the remaining two are in Australia (University of South Australia and UTas). In most cases, these Schools began exploring the opportunities of D/B and LBM at the beginning of the 1990s.

The literature suggests that there are three different models in practice. The first model, *Collaborative Design-Build (C-DB), indicates that all students are involved in designing and building their project.* The second model, *Design-Build (DB)* differs from *Collaborative Design-Build (C-DB),* as one student design is selected to be built by the class. The third model, *Build (B),* is distinguished from the other two

models, as students are only involved in the building of the project. In many cases the lecturer has designed these projects.

Table 3.4 Characteristics of LBM and D/B Studios

		Origin	Model	Option/ Compulsory	Sole commitment	Project carried over	Class time (days)	Year levels	Class size	Project type
Aust	University of Tasmania	1993 (1970s)	*C-DB, DB* and *B*	O/C	Yes /No	Yes /no	14/ Sem	1-5	15-60	Com/ Edu
	University of South Australia	1993	*D/B*	O	No	Yes	14-20	2-5	22	Com
North America	Auburn University	1992	*C-D/B* and *DB*	O	Yes	Yes	Sem	2,5	12-15	Com
	Cranbrook Academy of Arts		*B*	O	Yes		Year		8	Edu
	Dalhousie University	Early 1990s		O/C		No	14-28	1-4	8-10*	Edu
	Miami University	1994/6	*C-DB*	O	Yes /No	Yes		3-4		Com
	Southern Polytechnic State University	1993	*DB*	O	No	No	Sem	4	20	Com/ Edu
	Temple University	Late 1990s	*C-DB*	O	Yes	No	30	1-4		Com
	University of Arizona	1996	*DB*	O	No	Yes	Sem	3+	28	Com/ Edu
	University of Arkansas	1999	*DB*	O	No	Yes	Sem	4-5	16	Com
	University of Illinois	1994	*DB*	O		Yes /no	15+	2-4	15-18	Com/ Edu
	University of Kansas	1995	*C-DB*	O		Yes	Sem (x2)	3gr	8-17	Com/ Edu
	University of Oklahoma	1995	*DB*	O	No	Yes	Sem	3-4	15-30	Com
	University of Oregon	1991 (1922)	*C-DB*	O	No	Yes	Sem+			Com
	University of Washington	1988	*C-DB*	O	Yes	Yes	Qter		20	Com
	Washington State University	At least 1998-	*DB*	C	No	No	6-8 wks	3		Com
	Yale University	1966	*DB*	C	Yes	Yes	Sem	4(?)	40	Com

Abbreviations:

C-DB: Collaborative Design-Build, DB: Design-Build, B: Build (the initial design by other),

Sem: Semester, Qter: Quarter, 3gr: Third year graduate, Comm: Community Project and Edu: Educational Project

In terms of LBM Studios at SA Utas, the *C-DB* model is the preferred model. However, different lecturers have experimented with both *DB* and *B* models. At least

half the schools in Table 3.4 use the *C-DB* model, as it is important to them that students learn to work in teams and to appreciate that design is not always an individual pursuit. Only the Cranbrook Academy of Art solely operates with the *B* model: the literature indicates that the lecturer involved generated the initial design sketch and the students interpreted and built this design on campus.

It was uncommon for D/B Studios to be a compulsory unit, although it was at Yale University. Since 1966, students completing their first year of the Master of Architecture undertook a D/B Studio, a tradition founded by the late Charles Moore. Both SA UTas and Dalhousie University offer LBM or D/B Studios respectively as a compulsory and an optional unit. In the case of SA UTas, LBM has generally been offered as an option in second and third year and as a compulsory component of first year *Design Studio*. This situation is subject to change in terms of compulsory participation, as its inclusion in *Design Studios*, *Building Technology* or *Theory in Design* (units at SA UTas) is at the discretion of the lecturers involved and their interest in LBM principles. It appears that the incorporation of D/B and LBM Studios into other units is linked to the interest of certain lecturers.

In approximately half the schools, the students participating in D/B Studios did not 'juggle' the demands of multiple units; it was their sole commitment. When this finding was compared with other main characteristics, there was no further explanation why some D/B Studios were the students' sole commitment. It is most likely that these Studios occur in the semester break, removing students' commitment to other units. In the majority of the D/B or LBM Studios (12 of the 14), projects were carried over to another unit as it was not possible to complete the project in one academic semester or quarter. This is not the case at SA UTas, where of the 45 projects listed in Table 3.1, only a few have extended beyond the academic semester, due to unforseen circumstances. At SA UTas it is considered important that students experience the entire process of designing and building within the one unit. Some of the other D/B Studios undertake large projects that take a couple of years to design and build, therefore a number of studios contribute and build on previous studio work to complete the project. Dr Andras Kelly has cited another reason why projects are not carried over to consecutive units at SA UTas: levels of student motivation. If a project is extended beyond a unit semester, it is very difficult to motivate students to complete the project (A Kelly 2000, pers. comm., March).

The main reason projects are carried over in LBM and D/B Studios is the size and complexity of the project. For example, the schools from Auburn University, Yale University, the University of Kansas and the University of South Australia undertake large projects such as designing and building private residences or community centres. This raises the question of whether the students' learning experiences gained from their involvement in part of the project is as beneficial as involvement in the entire process of designing and building. Currently this a difficult question to answer due to the limited amount of data available.

In the examination of these schools, D/B and LBM Studios were generally offered to third or fourth year architecture students. In the case of SA UTas, Dalhousie University and Temple University, D/B and LBM Studios were offered from first year onwards, but this was dependent on the interest of the individual lecturer. This suggests that there is no strong argument concerning the position of D/B and LBM Studios in the curriculum, apart from Yale University's use of it as a foundation experience.

There were no commonalities in the class sizes: they ranged from 8 to 60 students. SA UTas had the largest class size of 60 (first year *Design Studio*). Generally, LBM Studios at SA UTas are capped at 40 students due to work health and safety reasons in the School Workshop. Auburn University recommends that within the class small project groups of seven members be formed to facilitate interaction and experimentation. This indicates that the class size in Table 3.4 for Auburn University of 12 to 15 must be greater in some projects (*Architecture* 1997).

The final category, 'Project purpose', determines whether the D/B and LBM Studios are linked with community projects or that their sole purpose is education. In particular, the driving force behind the D/B Studios run by Auburn University, University of Washington and Miami University is to make students aware of and to give them contact with impoverished communities. Generally, architects and architecture students have limited contact with these types of communities, so these schools are attempting to broaden their students' knowledge and experience. These D/B Studios (at Auburn University, University of Washington and Miami University) give students not only the opportunity to improve their working

knowledge of designing and building but also the opportunity to work collaboratively with these communities to improve their circumstances. The University of South Australia has recently been involved with an Aboriginal project in Western Australia and in the future plans to undertake more projects with similar communities in the Australian outback (Morris 2002, pers. comm., September). In the case of 'Community' projects, the students gain the additional experience of working with a group of clients. 'Community' projects also ensure contact with local authorities and consultants such as engineers, planners and landscape architects.

'Community and Education' in Table 3.4 refers to the D/B or LBM Studios, using the studio to educate students in design and building as well as contributing to the community. For example, at SA UTas, two types of LBM Studios have evolved: the first are design and build public projects for the community and the second to design and build smaller objects such as screen or piece of furniture in a short time frame. Similar models occur at Southern Polytechnic State University.

The comparison of the main characteristics of a number of D/B and LBM Studios allows conclusions to be derived. Most of the D/B and LBM Studios are:

1. community focused;
2. optional within the curriculum;
3. positioned in the middle years of architectural education; and
4. one of three models: collaborative design-build, design-build (one design is selected to be built by everyone) and build (the initial design occurs outside the studio by others).

3.5.2 Important Learning Experiences

The comparison of LBM and D/B highlights the main characteristics but it does not shed light on the students' learning experiences. Another comparison was initiated to compare educational objectives, as it was thought that they would give a clear and concise description of what students in D/B or LBM Studios were expected to learn. However, educational objectives were difficult to obtain for several reasons, including:

- In most cases the books, journal articles and the various schools' web pages did not provide enough detail for analysis to occur;
- Responses to requests for this material from the schools were largely unanswered; and
- In the specific case of LBM Studios at SA UTas, an Expert Validation Panel (comprising Professor Roger Fay, Dr Andras Kelly, Dr Zbigniew Brombrek and Dr Paula Whitman) was formed to categorise themes as 90 unit objectives were identified from unit outlines between 1994 to 2001(Appendix 3.4). Two panellists did not submit as they were unsatisfied with their findings and the findings of the other two panellists were too general to assist in this process of describing LBM Studios. Therefore, this process was not used in this thesis.

This research suggests that due to their experimental learning structure, in which students determine their objectives and learning experiences, D/B and LBM Studios have experienced difficulty in describing the educational objectives. The process of clarifying the educational objectives has not been assisted as the different scale of projects undertaken and the material palettes have varied significantly. Due to the difficulties in describing educational objectives, the assessment criteria used in D/B and LBM Studios are even less descriptive of students' learning achievements.

As the comparison of the educational objectives of LBM and D/B Studios was not possible, the focus of the comparison was shifted to the learning experiences. Of the 17 schools of architecture, only 13 had sufficient information available to be included in this comparison (Table 3.5).

The *process of design and build* was common to all the D/B and LBM Studios. For Auburn University, it was critical for students to transform their abstract knowledge from study into a workable solution "...by real human contact, personal realization and gained appreciation for the culture" (Auburn University 2002). Carpenter also believes that the "hands-on learning, inspire students to devise design form from their three-dimensional experience of materials and how these can be constructed together" (2000, pers. comm., 19 April).

At the University of Illinois, Hinders (2002) refers to the D/B Studio's connection with the Bauhaus, the combination of abstract design principles and 'first-hand' material knowledge. According to Brouard (Yale University), D/B and LBM Studios are often criticised as students are not always involved in every activity but he believes that "...all of them have formed an opinion about how the process works" through their observations (1997, p. 53).

Table 3.5 Comparison of Important Learning Experiences in D/B and LBM Studios

		Process of design and build	Hands-on learning/real project	Understand the building process	Teamwork/collaboration skills	Community service	Sources for design inspiration	Communication skills	Enhance design knowledge and skills by building	Materials/Tectonics explorations	Developing building skills	Three dimensionality and space
Universities that offer D/B and LBM Studios	University of Tasmania	Y	Y	Y	Y		Y	Y	Y	*		Y
	Auburn University	Y	*	Y	*	Y	Y	*	Y	*	Y	
	Cranbrook Academy of Arts	Y	Y	Y						*	Y	
	Miami University	Y	Y	Y	Y	Y	Y	Y	Y			
	Southern Polytechnic State University	Y	Y		Y	Y		Y		Y		Y
	Temple University	Y		Y						Y		
	University of Arkansas	Y	Y		Y			*	Y			Y
	University of Illinois	Y	Y		Y		Y	Y	*	Y		Y
	University of Kansas	Y	*	Y	Y		Y			Y	Y	
	University of Okalahoma	Y	*			Y			Y			
	University of Oregon	Y	Y		*					*	Y	
	University of Washington	Y	Y	Y	Y	Y	Y	Y				
	Yale University	Y	*		*	Y			*	*		
	Total	13	8	7	7	6	6	5	5	4	4	4

* indicates that this learning experienced was implied by the text

Hands-on learning was another learning experience popular with D/B and LBM Studios. The University of Oregon indicates this was vital, as the students following their own design instructions rapidly discover the "inaccuracies and inefficiencies of their design" (Univerisity of Oregon 2000). Concern was also levelled at the principle of *hands-on learning* by Ascher-Barestone as the projects at the University of Kansas (built by unpaid student labour and supported by grants) were sometimes

sold, questioning the ethics and comparing the balance of student learning to 'free' student labour (2002, p. 192). It was also thought that the compressed time frame to design and build a residence in less than a year minimised the students' dialogue with consultants, authorities and client (sometimes there was no client as the building was speculative) (Ascher-Barnstone 2002, p. 186).

Of the studios examined, half supported the importance of students' *understanding the building process*, by "demystifying the construction site and [through the] realisation of architecture from a drawing (Mockbee 1997, p63). *Developing building skills* was not as essential, as Oppenheimer Dean explains:

> *...it's valuable but not totally necessary. What's important is that the students' understand the process ... for young architects it takes it out of the theoretical and makes it real ... students learn that drawing on paper and building models is not architecture"* (Mockbee in Oppenheimer Dean 2001, p. 80)

Teamwork/ Collaboration skills was another learning experience highly prized by half of the D/B and LBM Studios. Miami University aims to prepare its students for working in the profession, where it is of critical importance for practitioners to communicate effectively with peers and clients (T Dutton 2002, pers. comm., 6 November). Ascher-Barestone believes that it challenges students' notions "about authorship (collaboration), the sources of invention, and even the distinction between design and production" (2002, p. 186). Finally, Carpenter states simply that "the project rather than the ego is the boss" (2000, pers. comm., 19 April). These remarks endorse one of the main finding of the RIBA, *Rethinking Architectural Education for the 21st Century* (1999), that it is important for students during their education to participate in collaborative and interdisciplinary projects where clients' needs are the principle concern.

Many of the D/B Studios examined in this initial study (6 of 13) and review of literature, are strongly influenced by the idea of *community service*. Early in the development of the D/B Studios at Auburn University, it was clear that "the social development of the architect" (Ivy 1994, p. 62) and a desire for students "to work as citizens of the community" (Aurbun University 2002) were central to their program. There were several other reasons cited such as giving back to the community and getting to know communities which usually cannot afford the services of an

architect. It was also thought that this experience would demonstrate that *sources for design inspiration* could be born from understanding culture and place (Oppenheimer Dean 2001, p. 78).

The remainder of the learning experiences identified were *communication skills, enhancement of design knowledge and skills by building, materials/tectonic explorations,* and *three-dimensionality and space*. Only SA UTas, University of Kansas and University of Washington identified ESD concerns as important. The designs of projects from Auburn University also indicate that ESD issues influence their work, even though it is not cited as such. ESD was not listed as an important learning experience due to the low number of references to it.

The main learning experiences identified match those identified by Fowles' for his D/B Studios in 1983 (at the Welsh School of Architecture). He refers to the importance of integrating the designing and making process, as it is his belief that these aspects of architecture "cannot be covered or simulated in any other way" than through physical application of theory (1983, p. 13). At the end of his paper Fowles indicates that D/B Studios are experiencing positive attention and increased interest. During this literature review only a few examples of D/B and LBM Studios were found in the United Kingdom. It appears that Fowles (still at the Welsh School of Architecture) no longer provides this type of experience but is now involved in ESD research and its applications.

3.6 Conclusions

At the beginning of this chapter, the idea of EL and its teaching applications were explored. It was apparent following the description of LBM at SA UTas that LBM fits the idea and teaching application of EL. However, it remains unclear whether all the concerns associated with EL affect LBM Studios in a similar manner. For example, the concerns associated with EL that need to be examined in more detail with LBM Studios are: the need for facilitators to have highly developed inter-personal skills; the impact of group work, the effect of inadequate assessment

procedures; and the inability of learners to interpret generic principles from their experiences to apply in other situations.

The description of LBM at SA UTas provided an overview of what students may experience and the type of projects that had been undertaken since 1994. It did not describe the individual student experiences since students work in small groups. In detailing the LBM teaching process it was acknowledged that the lecturers, tutors and workshop manager take a facilitator's role and assist the students in the process of designing and building for a client. The lecturers involved in LBM Studios claim that students' skills in communication and teamwork were improved and reinforced. In terms of the entire process, it is believed that students gain a unique opportunity to link knowledge and skills associated with designing and building. However, it is unclear whether this occurs for every student participating in LBM Studios. Yet, this was the main reason that LBM Studios were reinstated at the SA UTas.

The use of computer modelling and the CNC flatbed router at SA UTas in LBM requires further monitoring as students are becoming more reliant on these tools and prefer to use the CNC flatbed router to making scaled models. Potentially, the engagement of this tool too quickly in the process may limit students' learning experiences in practical knowledge of construction and the practice of iterating design details and may go against the initial principles established by Clayton *et al.* This has not been included in the scope of this study, as its impact cannot be fully appreciated until more is understood about student learning experiences in LBM Studios.

The literature review in this thesis only identified one research project that examined the educational benefits of D/B Studios. Completed in 1983, Fowles concluded that there was minimal material or research data available on D/B projects in architectural education. It was thought that the people involved in D/B projects might be more interested in 'doing' than 'writing'. Similar findings were drawn by this thesis. D/B and LBM Studio lecturers were more likely to write papers that outline the process used on a particular project, but did not examine the pedagogical model or educational benefits in detail. Furthermore, most LBM and D/B facilitators had difficulty in clarifying specific learning objectives and assessing educational

outcomes. It also appears that these difficulties were experienced by well qualified architectural educators who were not associated with D/B or LBM Studio activities.

In addition, a comparison of LBM Studios and D/B Studios supported the need for more detailed research data. The comparison between LBM and D/B Studios characteristics was a valuable exercise, as it is believed that this is the first time it has been presented in a condensed table format. In this format, a number of similarities and differences were identified which will assist future research. The two most significant differences between LBM and most D/B Studios were that D/B Studios are predicated on community service and projects extend beyond the unit semester. Generally, a large D/B project will extend over a year or more, which means that different student groups will contribute to the designing and building. Alternatively, LBM project briefs are deliberately small in scale so students experience the entire process of designing and building.

In summary, D/B or LBM Studios appear to be located within the curriculum according to pragmatic reasons such as the lecturer's interest or its incorporation as an elective unit. It does not appear that pedagogical reasons have influenced its positioning thus far, except for Yale University. Yale University believes that D/B Studios provide an important foundation experience and therefore it is part of their first year for masters' students.

By means of this study into LBM Studios at SA UTas, a more detailed and complete record of students' learning experiences will assist in testing the claims or criticisms of the LBM model. In addition, with a better understanding of student learning experiences, LBM Studio objectives and assessment procedures can be refined or rewritten in keeping with issues related to *Diversity, Teamwork* and *Relationship between Education and Practice*. By documenting and clarifying LBM at the SA UTas, more scholarly discourse can be initiated between LBM and D/B Studios.

3.6.1 Research Aims

There were many potential research opportunities identified in the literature review. However, the most pressing gap in our knowledge concerns the need to establish whether the rhetoric regarding the educational benefits of LBM matches the students' experiences and perceptions. The research aim, therefore, is to identify:

The educational benefits gained by students who participate in LBM Studios.

To address this research aim, specific research questions have been developed to determine what each student does in a LBM Studio. This is unclear due to teamwork structure and the fact that students have a greater choice to determine their involvement in tasks. This also responds to the curriculum concerns raised by SA UTas. The second need is to establish whether participants' evaluation of LBM outcomes matches the educational claims purported by LBM lecturers. Therefore, the specific research questions are:

Research Question 1 (RQ1): What are the Students' Levels of Cognitive Engagement in LBM Studios?

It has been a frequent concern that LBM Studios are too time consuming in comparison to other units and that students undertake long periods of repetitive motor tasks whilst building. This research question aims to identify the proportion of time that students are engaged in higher-level problem solving, cognitive activities, and repetitive motor tasks for the duration of the studio. This addresses the identified need for architectural education to be diverse in its delivery of knowledge and skill development. It also determines whether students spend a disproportionate amount of their time building.

Research Question 2 (RQ2): Do Students have Consistent Learning Experiences in LBM Studios?

Having established the typical activities and the percentage of time spent on each, it is important to ascertain whether experiences gained in LBM Studios are consistent for the whole class. Does every class member gain similar opportunities to design, problem solve and construct? Critics within the SA UTas have speculated that the

small number of students involved mostly perform the simple and repetitive motor tasks and do not engage with cognitive activities or high-level problem solving, while others students may be involved in a variety of simple tasks and high-level problem solving. This addresses the identified need for student experiences to be diverse but consistent and equitable. It also considers whether LBM Studios allow all participants to gain sufficient experiences to understand the relationship between design and construction to improve their design thinking and practical construction knowledge, an objective identified by the *Relationship between Education and Practice* (**Chapter 2**).

With the identification of student learning experiences in LBM Studios, it is important to establish if the students transfer the benefit (or appreciate the connection) from these learning experiences to their other units such as *Design Studio* or *Building Technology*.

Research Question 3 (RQ3): What Benefits do Students Believe Result from Participating in LBM Studios during their Architectural Education?

It is important part of the process to identify what students believe were the benefits received from their participation in LBM Studios, for two reasons. First, it would assist the identification of the range of activities and learning experiences that students are involved in, during a LBM Studio. Second it would verify lecturers' claims regarding the educational benefits gained by students' participation in LBM studios.

In order to investigate the educational benefits of LBM Studios, **Chapter 4** describes the research design and how these specific research questions influenced the studies.

Chapter 4: Developing the Research Design

4.1 Introduction

The review of literature in Chapters 2 and 3 indicates that the LBM teaching method is not a new phenomenon. Since the 17th century, those involved in the education of architects in Britain have debated the importance of including practical building experience. However, during this period, models similar to LBM and D/B gained and lost favour. The primary influence was the elevation of architecture to a professional status, which differentiated it from its origins as a guild of artisans and builders. Thus, the inclusion of LBM in university architecture courses has been problematic, due to its perceived proximity to technical training.

Despite the long history of LBM and D/B being a part of architectural education, the literature review shows that limited research has been undertaken in this field. In general, while architecture students and the profession believe that LBM has benefits and values, the specific details remain unclear (see Chapter 1 and Section 3.4).

This chapter discusses how this thesis' research design was generated in light of the absence of research precedents in this field and how it addresses the specific research questions (Section 3.6.1). It begins by identifying approaches useful for the evaluation of architectural education and curricula in general. Having identified a useful research strategy, a range of research methods (observation, questionnaires, and interviews) were developed. The rigour of these qualitative methods is discussed, together with the limitations of the research design and data gathering strategies.

4.1.1 Evaluating Architectural Education in Australia

In Australia, there is a joint process of accreditation and recognition for architecture courses, which is administered by the Registration Boards of Architects and the

RAIA. Representatives from a National Visiting Panel (NVP) assess the core areas of design, documentation, project management and practice management.

To assist the accreditation process, *The National Competency Standards* (NCSA 01) define " the minimum standards of performance in core areas of competence required of an architect" (AACA 2001, p2). This document does not assist in assessment of LBM, as LBM is not a 'core area', and the standards refer to a 'graduate architect', not to a student at the beginning or middle of their course.

Another part of the accreditation process is *The Subject Area Proforma* (DOC ACRP 02.1). Schools of architecture are required to provide detailed information annually on subject areas for the Visiting Panel to inspect. The criteria include: unit descriptions, aims and objectives, required student output, teaching methods, assessment methods/feedback, facilities, staffing and student numbers, as well as student exemplars. The Visiting Panel awards a simple rating of satisfactory or unsatisfactory and sometimes provides additional written feedback. There are problems in utilising this approach for this research: first, the information required (such as the aims and objectives) is too broad in description, and provides no means of assessing LBM. Second, the formal assessment of this information relies on an expert and external panel, which is beyond the scope of this thesis. Third, the external panel is unlikely to have the specific expertise required to evaluate a specialised and unfamiliar form of pedagogy, such as LBM.

4.1.2 Evaluating Curriculum in Education

Within the literature on education, there is a range of approaches developed to evaluate curriculum. The third edition of *Curriculum: Alternative Approaches, Ongoing Issues* (Marsh and Willis 2003) provides a critical discussion of the four main models of curriculum evaluation. The models are:

- **The Objective Model**, based on Tyler's work (1949). It was deemed to be limiting, as its appraisal was based on the objectives only and did not allow other observations to inform the curriculum evaluation (Marsh and Willis 2003, pp. 305-307).

- **The Countenance Model** built on the Objective Model by the work of Stake (1967). The approach extended beyond objectives to include observations and intents. The term 'intent' is used "to avoid controversies about goals and behavioural versus non-behavioural objectives" (Marsh and Willis 2003, p. 310). The amount of information required for the Countenance Model was too large for the research period available.
- **The Educational Connoisseurship Model** based on Eisner's work (1979), relies on expert interpretation and critique, and was not viable due to cost and time implications of hosting an expert panel to observe the duration of one LBM studio (Marsh and Willis 2003, p. 310).
- **The Illuminative Model** developed by Parlett and Hamilton (1972):

> *Illuminative evaluation is not a standard methodological package, but a general research strategy. It aims to be both adaptable and eclectic. The choice of research tactics follows not from research doctrine, but from decisions in each case as to the best available techniques: the problem defines the methods used, not vice versa* (p. 8).

The Illuminative Model is considered useful for this thesis because the model consists of three overlapping stages, which allows the strategy to become more refined according to new knowledge and insights identified during the research period. During the first stage, 'observation', allows the researcher to design an instrument with which to become more familiar with the field of study. The second stage of 'inquiring' allows the researcher to refine the direction of the study from the new insights or phenomena identified in the first stage. At this point, another research method is selected to make a more detailed inquiry into these important insights or phenomena. Finally, the third stage, 'seeking general principles', identifies and corroborates the cause and effect pattern by means of triangulation. Triangulation refers to an approach used to check data collected by selecting other qualitative research methods (observation, interview or questionnaire) in order to explain or fill the gaps (Marsh and Willis 2003, pp. 315-316).

The Illuminative Model can be likened to Richardson's Iterative Mixed Method of Design, discussed in the *Handbook of Research of Teaching* (2001). It is described as

> *...different methods [taking] turns over time, either to develop one method from another, or more substantively, to focus progressively on critical insights and understandings* (Greene, 2001, p257).

In addition to this link, the Illuminative Model shares many similarities with the design process, as the proposal is refined iteratively reflecting the new information and evaluating its merit and faults.

4.1.3 Suitability of Social Science Research Strategies

Social Science research strategies include surveys, case studies, experiments, ethnography and action research (Denscombe 2001). The suitability of these research strategies was initially determined by referring to Denscombe (2001), and if a potential application was identified, further sources were used.

Surveys, case studies and experiments were less appropriate for this thesis. According to Denscombe (2001), the survey strategy would limit the study to taking only a *macro view*. It would mean that detailed data on specific relationships or processes would not be considered as a part of the study (p. 7). Conversely, case studies would facilitate the collection of data on specific relationships and processes in particular instances only at a *micro level*. Second, the literature review did not highlight in sufficient detail, the importance of certain relationships or processes to support an immediate focus on a case study (Denscombe 2001, pp. 30-31). It would be inappropriate to apply the experimental strategy due to limited knowledge of the important factors (consistency of student experiences and specific educational outcomes) that may affect the effectiveness of LBM Studios. Therefore, these factors could not be evaluated in a 'skilled manner' (Denscombe 2001, p. 43).

In terms of suitable research approaches, it is possible to align ethnography with the Illuminative Model, as the former employs a multiple approach of data gathering techniques to gain a better understanding of the phenomenon that the participants are exhibiting (Tedlock 2000, p. 470). Ethnography attempts to capture the behaviour patterns of human beings in their natural setting, then to test whether these behaviour

patterns are replicated in other similar examples, and finally to confirm or refute the researcher's theory (Burns 1997, pp. 299-300).

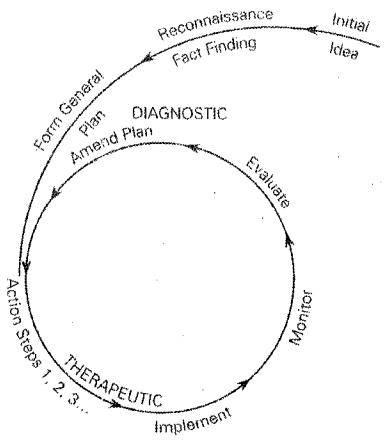
Often the ethnographic approach is divided into three phases. It is in the description of the process that similarities become evident between ethnography and the Illuminative Model. The goal of the initial phase of the research is to conduct a broad study and to explore potential ideas and lines of inquiry. In the second phase, significant issues emerge from the analysis of the data collected. Consequently, the initial research interest is refined into "working hypotheses and propositions" which address the significant issues in the study (Burns 1997, p. 308). With this knowledge, the third phase represents the testing of a "restricted number of hypotheses" (Burns 1997, p. 308). This strategy allows the researcher to learn during the research process. The reliability of this information is then tested by repeating the study (Burns 1997, pp. 308-309). Ultimately, ethnography is less appropriate for this study as its focus on recording actions and behaviours of a group did not match the requirements of this thesis, to identify individuals' contributions and experiences within their groups (**RQ2** – consistency of students' learning experiences)

Action research also shares similarities with the Illuminative Model due to its iterative refinement process (for example, refer to Figure 4.1 and 4.2). In particular, Lewin's Model of Action Research is referred to in the development of EL (which is associated with LBM in Chapter 3). However, it was inappropriate to select action research for this thesis (see Section 4.4 Academic Rigour), as its main role is to change and improve practice by working with the lecturers involved (Denscombe 2001, p. 58).

4.1.4 Thesis' Research Strategy

Therefore, against this background knowledge of qualitative approaches, the research strategy deemed most appropriate for this thesis was the Illuminative Model (Parlett and Hamilton 1972). In particular, the close association between the Illuminative Model and the design process used in LBM Studios to generate new knowledge, was an important consideration. Details of the research design are discussed in the

following section. The discussion includes the validation and evolution of different studies and the methods and its limits.



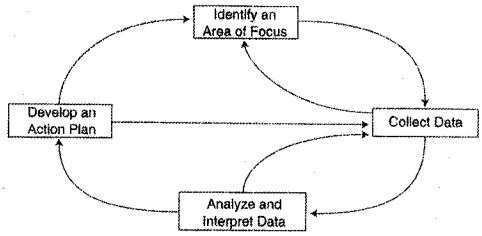


Figure 4.1 and 4.2: Lewin's Model of Action Research (in Burns 2000, p. 445) and The Dialectic Action Research (in Mills 2002, p. 19)

4.2 Research Design: Methods and Research Plan

4.2.1 Research Plan

The research design was 'fluid' in its development, according to the principles of the Illuminative Model: 'observation', 'inquiring' and 'seeking general principles' (Parlett and Hamilton 1972). Over the course of this study, the research aims and methods became more detailed. Three data gathering techniques were used: observation, questionnaires and interviews. Before describing the reasons for the selection and use of these research methods, it is important to detail the research design process (see Figure 4.3, p. 63).

One of the limits in applying the Illuminative Model, is the potential extension of the data collection period, as the investigation process may 'identify' unknown characteristics that require further supporting data. Initially, the research period to collect data on LBM Studios was a year, commencing in Semester 2, 2000 and finishing at the end of Semester 1, 2001. The bands of yellow represent study

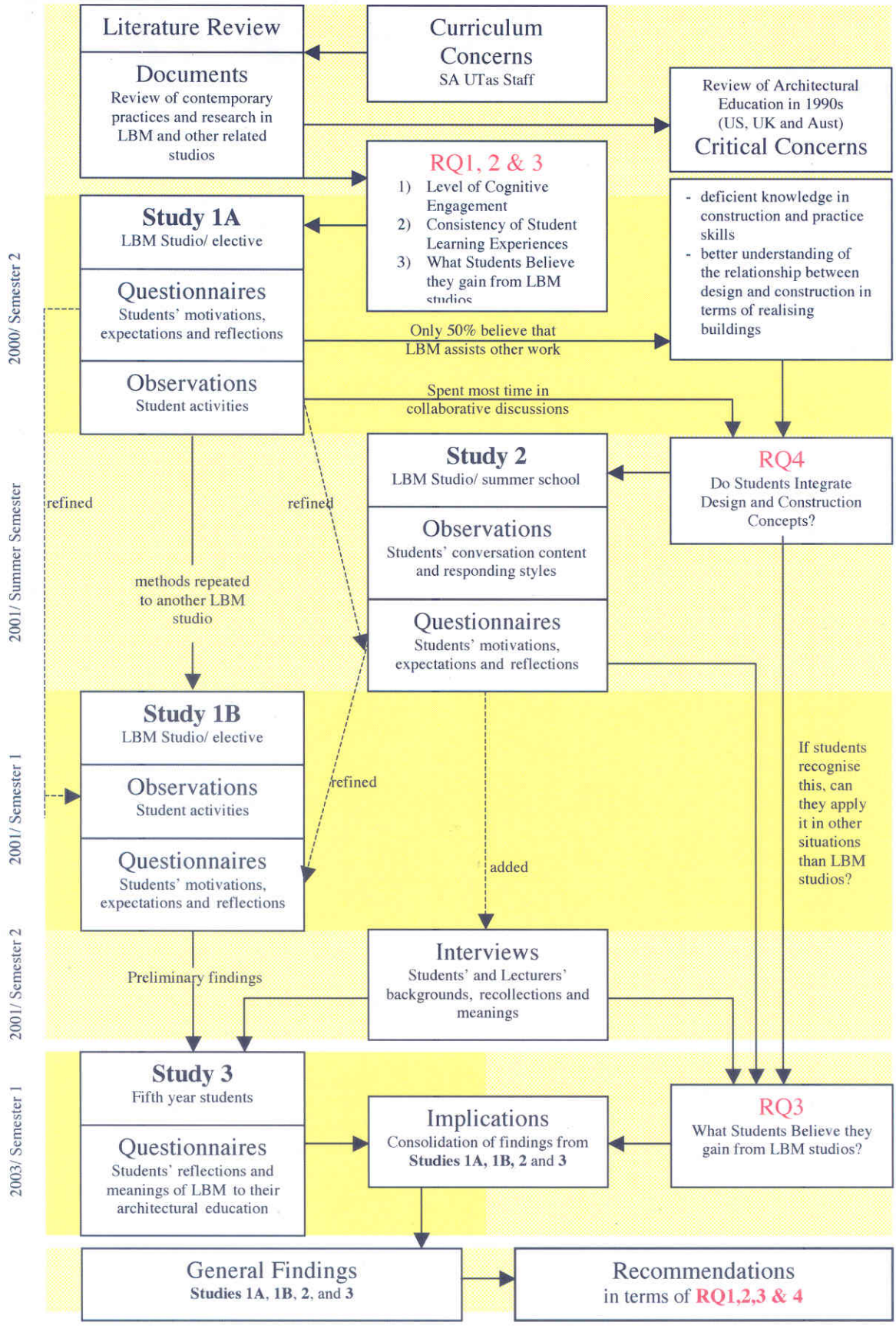


Figure 4.3: Research Design Diagram

periods. This was extended after data analysis suggested that further supporting information was required to more fully address what students' believed they gained from their participation in LBM studios (**RQ3** – Students' beliefs concerning the benefits gained from LBM Studios).

In response to **RQ1** (students' level of cognitive engagement) and **RQ2** (consistency of students' learning experiences), **Study 1A** used observation to collect data on student activities in SA UTas LBM Studios. Questionnaires were also given to participating students at the commencement of the LBM studio (to collect data on their motivations and expectations) and on completion of the LBM studio (to record their reflections on their experiences and potential benefits, **RQ3**). It was important to augment the observation data with background information from the questionnaires, to gain a better insight into student actions and behaviours.

From the preliminary analysis of this data, it became apparent that the observation method should be more focused on the content of student conversations. The data results from **Study 1A** shows that students spent the largest percentage of their time discussing ideas and decisions with their fellow group members. A study of the content of students' conversations would identify more readily the reasons and thoughts behind their actions, than by observing their general activities in **Study 1**. Vygotsky (1987) notes, "the very process of putting experience into language is a meaningful-making process" (in Seidman 1998). LBM Studios provide a unique opportunity to observe students' design and problem solving processes and therefore **Study 2** includes the analysis of students' conversation content for an entire LBM studio.

In addition to understanding conversation content, preliminary findings from **Study 1A** indicated that students had difficulty appreciating the benefit of LBM knowledge in relation to other units. Anecdotal evidence suggests that students do not consider design and construction issues concurrently, in other units. This was a concern, as studios such as LBM are believed to improve students' knowledge of the relationship between design and construction. Consequently, **Study 2** focused on whether students link design and construction concepts during the LBM studio by examining the content of their conversations. This concern also initiated **Research Question 4**

(RQ4) addressing whether students linked design and construction concepts in LBM Studios (detailed in Section 6.1). A summer LBM studio held in January 2001 accommodated this new line of inquiry. Originally, this LBM studio was excluded from **Study 1B** as its format of 17 intensive days differed from the previous LBM Studios during the semester. As in **Study 1A,** questionnaires were given to students at the commencement of the LBM studio and on the completion of the project (**RQ3** - Students' beliefs concerning the benefits gained from LBM Studios). The strategy of collecting background information and the students' reflections was maintained but some questions were refined (detailed in Section 5.3.1).

Study 1B was undertaken in the same manner as **Study 1A**, and included observation and questionnaires. The initial intent was to compare data results from **Studies 1A** with **1B** – however, a late and unforseen staffing change in the LBM studio led to a new LBM teaching process being initiated in Semester 1, 2001. There were additional variables: in **Study 1B**, the LBM studio was mainly held on three long weekends instead of one day a week for fifteen weeks. Second, the project brief required students to individually design furniture pieces for themselves, as opposed to the collaborative design for a community client (as in **Study 1A**). Finally, the make-up of the class was evenly split between experienced and inexperienced LBM students, whereas participants in **Study 1A** were experienced. Due to the differences in the observed LBM Studios the results could no longer be directly compared in order to verify possible links between teaching models and student experiences.

In Semester 2, 2001 a preliminary analysis of comparable data results was made from **Study 1B** and **2**. The findings showed that further corroboration was required to check whether observations and interpretations were an accurate reflection of the students' experiences. Accordingly, interviews were conducted with students and lecturers concerning their LBM experiences, this provided more in-depth information on **RQ2, 3** and **4.**

Finally, the results of the interviews combined with the findings of **Studies 1A, 1B** and **2** led to the last study, in 2003. **Study 3** examined specifically, fifth year students' personal reflection on the value of LBM Studios to their architectural education, as this that remained unclear from the data collected. Did these students

acknowledge or recognise the benefits of the knowledge and skills gained in LBM Studios? If not, then these experiences did not achieve their objective of improving students' understanding of the relationship between design and construction. It was important to complete this part of the research with the fifth year students, as students from this particular year group had been members of previous studies, thus providing excellent comparative data.

The application of the Illuminative Model provided the capacity to respond to new knowledge gained through observations, the flexibility to adjust to unforeseen changes in the LBM studio format and the ability to initiate new studies in relation to preliminary findings. Through this process, the researcher's 'first hand' knowledge can develop in terms of the implications and capacity of different research methods. The disadvantage of this research design was associated with the management of large amounts of data, resulting in an extended period needed for data collection and analysis. The following section details the data gathering techniques that were employed.

4.2.2 Methods

a) Observations

When "...a researcher has reason to believe that such factors as detachment or distortion in recall may significantly affect the data, they will always prefer observational methods" (Burns 1997, p. 316). It is for this reason, that the observation method was selected for both **Studies 1** and **2**, as it provided the most 'objective' data collection method for a qualitative study (see Section 4.4 Academic Rigour).

The observation method is commonly used in the field of education research to record students' behaviour and actions, because in many cases students may not feel comfortable or be able to articulate their experiences adequately. There are two main types of observation, reflecting the researcher's interaction with participants. Burns (1997) describes these as *participant* observation and *non-participant* observation. Within each, there are two more variations on the researcher's position. Denscombe

(2001) provides a similar breakdown (except he refers to *non-participant* as *systematic* observation). In both cases, *non-participant* or *systematic* observation refers to the researcher collecting data and not interacting with the participants. This usually involves an observation schedule, which supports the quantification of data. These are not used in *participant* observation.

Distinctions have also developed within the description of *participant* observation. The *participant* observer "...can be an *active participant observer, a privileged, active observer, or a passive observer*"(Mills 2002, p. 54). The *active participant observer* refers to an educator teaching a class and recording his/her observations and reflections. A *privileged, active observer* allows the researcher to change her/his level of participation. This assists in the process of recording accurate data. The *passive observer*, in this description, does not participate in the activity being observed but focuses solely on data collection (although still considered a *participant observer* as it is thought that the intrusion of the researcher observing the activity affects the participants' actions).

The observation method therefore presents many approaches regarding its design. A mixed approach was devised because none of the above approaches suited this study, but there were appropriate components belonging to *non-participant* and *participant* observation. It was believed that this combined approach is compatible with the Illuminative Model as it was designed for the specific context and needs presented by the study.

The literature on observation methods suggests that the main concern is "...to avoid disrupting the naturalness of the setting" (Denscombe 2001, p. 140). The naturalness of the setting refers to minimising the affect of observation on the participants' activities and behaviour. It is from this concern that a combined approach was employed. It was important to this study to make *systematic* observations using a schedule (Denscombe 2001, pp. 141-142) as it facilitated the comparison of data collected from different studios. However, this approach allows for only passive observation. Both Burns (1997) and Denscombe (2001) believe that the passive role of the researcher is ambiguous in its premise as the position of the researcher does affect the naturalness of the setting. Hence, the importance of including the

privileged active observer, which allows the researcher to change her/his role from passive to active as, required (Mills 2002, p. 54). This changing role of the researcher is believed to make the participants feel less apprehensive.

Angrosino and Mays de Perez (2000) address in detail this concern of the position of the researcher within the natural setting and its impact on the data collection. They suggest that the group's ideas about the role and the position of the researcher may change as the researcher takes part in the group's activity. This ensures that the members of the group feel less self-conscious of their actions by creating a 'situational identity'. This occurred regularly in **Studies 1** and **2**, as the students approached the researcher for assistance regarding their decision-making processes and their design and structural ideas, as well as wanting to know more about the observation process and records. Through this open interaction, students appeared to not be concerned by the presence of the observer. This was consistent with Burns' recommendation that the researcher should elicit "...cooperation, trust, openness and acceptance" (1997 p. 318) from the participants.

b) Questionnaires

In using an observation schedule (*non-participant* observer), Galton, Simon and Croll (1980) argue that relevant background information must be collected to illuminate students' actions or behaviour, otherwise the data is decontextualised. For this reason, questionnaires were incorporated as a part of the overall data gathering strategy for **Studies 1A**, **1B** and **2**. The questionnaire provides an effective means to collect data without the necessity for personal interviews (which were not conducted early in the study due to the time and resources required) (Denscombe 2001, p. 88).

Apart from personal and demographic information, a questionnaire may consist of three types of questions; closed, open and scaled. Closed questions require respondents to select from pre-defined options. An open question "supplies a frame of reference for respondents..." to answer (Burns 1997, pp. 472-3). Scaled questions require participants to rank or rate responses on the provided scale. All have advantages and disadvantages according to the aim of the questionnaire and the ability of the participants to comment or select responses from their knowledge and experiences. The questionnaires devised for **Studies 1A**, **1B** and **2** incorporated

closed and scaled questions because it was believed that the students would not respond to open questions as they had no previous experience considering these issues. In **Study 3**, the questionnaires were composed of open questions. By this stage the students were experienced in thinking and expressing opinions on their learning experiences in LBM studios, as they had participated in many.

c) Interviews

The interview method was very relevant to **Study 2** as it corroborated previous data collected through observations and by questionnaires. Participants were asked to recall their LBM experiences to verify whether the observation data was accurate and to provide 'rich' descriptions. Rich is a term used by Burns to indicate that the response expresses more detail than a basic answer to the question (2000, p. 572). This allowed participants to give feedback on the preliminary findings of **Study 2's** observations.

Kvale (1995) identifies 'communication' as one of three important methods of validating social research. It is through dialogue that the researcher can gain feedback from respondents and experts concerning data and findings. To this end, interviews were conducted in **Study 2** when both students and experienced lecturers discussed these issues with the researcher. Glassner and Loughlin (1987) also support the employment of the interview method after observation: "... it is more appropriate to engage in systematic observation before any interviewing takes place..." as it is insufficient to rely on pre-testing an interview schedule (in Silverman 1995, p. 106).

Seidman (1998) cites the main purpose of the interview as being to record "...the participants' meaning-making process" (p. 16). A semi-formal structure was employed in the interviews to allow greater discussion of issues. This allowed each interviewee to elaborate on other matters, directly or indirectly related to the original questions (prepared earlier). This flexibility encouraged the participant's perspective, "rather than the perspective of the researcher..."(Burns 1997, pp. 330-331).

An important part of the interviewing process was 'active listening' by displaying sensitivity and respect (both verbally and non-verbally) to participants. Burns (1997)

believes that participants will converse in language natural to them if the interviewer takes on the role of active listener (pp. 332-333). To ensure that participants' responses were not affected by the personal identity of the researcher (due to, for example, sex or age), Denscombe (2001) suggests that statements made during the interview are neutral and non-committal (p. 117). The interviews were tape recorded (with permission) to ensure the accurate recording and decoding of conversations while "maintain(ing) a rapport" with participants (Mills 2002, p. 60).

4.3 Sample

In most cases, pragmatics such as the data collection period, class size and demand of the research methods governed the selection and size of the samples, therefore results have not been generalised. The results from this research identify and establish different characteristics of LBM Studios. Academic rigour is discussed in Section 4.4.

4.3.1 Selection of LBM Studios

At the beginning of the data collection period Semester 2, 2000, there were two LBM Studios offered to SA UTas students studying in second and third year. The *Freycinet Furniture Studio* was selected for **Study 1A**. The other LBM studio available was the *Mud-brick Dome Studios*, but this was deemed unsuitable as it was continuing from the first semester and most of the designing and experimentation with building materials had already occurred. The repetition of **Study 1A** was planned for the first semester in 2001 due to time constraints. The *Flat-pack Furniture Studio* was studied for **Study 1B**, as there were no other LBM Studios offered. Initially this was considered unfavourable because the teaching model departed from the typical LBM model observed in **Study 1A**. The *Flat-pack Furniture Studio* was unusual in comparison with other LBM Studios, as the school of architecture invited two external lecturers to run this studio. It was their first experience in facilitating design and building in the workshop though both were experienced educators and had personally designed and built projects. **Study 1B**

provided an alternative teaching model to compare with the generally accepted LBM model (**Study 1A**, see Chapter 3.0 for description) and allowed the observation method to be replicated and tested for its reliability (see Section 4.4.1 Reliability).

In between **Studies 1A** and **1B**, the biennial Summer LBM Studio permitted a different line of inquiry into the LBM teaching model to be pursued, **Study 2**. As noted, **Study 3** encompassed an open questionnaire for the fifth year students.

4.4 Academic Rigour

In qualitative research, academic rigour is 'intelligently challenging' as many of the approaches employed to ensure a study's 'reliability' and 'validity' originated in the scientific tradition which operates on the basis that measurements can be made 'objectively' and there can only be one 'true' answer (Silverman 1995, p. 144). According to McLeod (2003), many of the approaches available to check 'validity' are inappropriate for qualitative research due to their reliance on measurement and correlations (quantitative). Consequently, "many researchers reject validity as an appropriate consideration" (p. 99). In contrast, Kvale (1995) argues that it *is* possible to validate qualitative research (free of the influence from quantitative approaches) "in relation to post-modern conceptions of knowledge" (p. 19). His strategies for addressing rigour are applied in this study and discussed below.

4.4.1 Reliability

'Reliability' refers to whether the methods employed in the research can be replicated by others to achieve the same results and draw the same conclusions. To demonstrate reliability in qualitative research requires sufficient information regarding the research aim, context, purpose, methods and "the reasoning behind key decisions" (Denscombe 2001, p. 213).

Common strategies employed by qualitative researchers to ensure reliability are retesting and triangulation, using more than one source or method to corroborate

data. In both **Studies 1** and **2**, more than one research method was used. **Study 1** included observations and questionnaires and **Study 2** involved observations, questionnaires and interviews. Individually these qualitative research methods may be of limited reliability. For example, it is difficult "to achieve objectivity and consistency" with interviews and questionnaires due to the influence of the researcher in the process (Denscombe 2001, p. 137). This underlines the importance of the inclusion of the observation method in both **Studies 1** and **2.**

This strategy of triangulating qualitative research methods using observation and interviews in the same study is referred to by Kirk as *synchronic reliability* (1986, pp. 41-42). It is important to note when employing triangulation that data from different sources are not always compatible and may not give a reliable and complete picture (Hammersley and Atkinson 1983, p. 199). This does not suggest that triangulation is inappropriate but ensures that consideration is given to the compatibility of different sources of data. In the specific case of this research project, triangulated data is associated with the same LBM Studio and its participants.

Qualitative researchers often reject triangulation as it originates from a quantitative research background. However the approach taken with triangulation in this study reflects Richardson's position (1994). He rejects the notion of a rigid triangle in regards to post-modern assessments as it assumes that a fixed point can be triangulated. Instead Richardson believes that the point may cover a larger area and be more like a "crystal" with many facets (1994, p522 in Kvale 1995). This prompts the researcher that there is more than one way of 'knowing' and multiple conclusions when interpreting data collected by different research methods (Kvale 1995).

4.4.2 Validity

Post-modernists' reject the notion of universal 'truth' and replace it with the perspective that "there are multiple ways of knowing and multiple truths" as knowledge is socially constructed and "validated through practice"(Kvale 1995). The idea circulates widely and is not unique to this author. In the selection of the research methods, it was also important to consider whether the findings were valid and

representative of the phenomena observed in the LBM Studios (Pelto and Pelto 1978, p. 33). Hammersley (1990) refers to this principle as 'truth'; that is, did the interpretations accurately explain the phenomena being investigated (p. 57). As indicated earlier, Kvale's (1995) post-modern approach to validity is adopted for this study.

Kvale (1995) applies a three-tiered approach to validity:

a) ***Investigation/Craftsmanship**: Validity is treated as an expression of craftsmanship, with an emphasis on quality of research by checking, questioning and theorizing on the nature of the phenomena investigated;*

b) ***Communication**: By going beyond correspondences criteria of validity, the emphasis on observation is extended to include conversation about the observations, with a communicative concept of validity; and*

c) ***Action**: By discarding a modern legitimation mania, justification of knowledge is replaced by the application, with a pragmatic concept of validity* (p. 19).

The implementation of these approaches in this study is detailed in the following section:

a) Investigation/ Craftsmanship

Kvale (1995) gives the analogy that this approach involves quality checks throughout the stages of 'knowledge production' as opposed to an inspection at the end of the 'production line'. In this study, this was achieved by applying the tactics of Miles and Huberman (1994) to identify the potential biases that existed in the data or sources. The tactics appropriate to this study include: triangulating, identifying and addressing researcher bias, expert feedback on the LBM process, negative evidence, follow-up surprises and feedback from informants (in Kvale 1995).

b) Communication

It is well known that interviews, as a method of data collection, can be fraught with difficulties. In this study, interviews are employed to gather data on student experiences from **Study 2** to confirm observation data. The interviews also provide an opportunity for participants to give feedback on the researcher's presence, other

important experiences in LBM studio and the preliminary findings of **Study 2**. In order to address issues that might arise from interviewer/interviewee relationships and from the richness of the data collected, Kvale's guidance was again sought. In terms of discussion rather than structured participant interviews, informants' feedback on transcripts and researcher interpretations produced valuable data.

c) Action: Pragmatic Validity

Pragmatic validity according to Kvale's model refers to developments in practice due to research findings. During this study, developments occurred in the practice of teaching LBM Studios. For example, some students experienced difficulty recognising the beneficial outcomes on other work of their 'LBM' experience. In an attempt to improve this situation, the researcher introduced a logbook (**Study 1B**). This was unsuccessful as students only filled in their logbooks at the completion of the studio. In **Study 2**, this idea was adapted to a reflective journal which was given to students at the beginning of the LBM studio. The journal provided a small space for each day (half of an A5 page), to paste images and to write about their learning experiences. This practice was further improved by setting aside time at the end of each session for students to reflect on their experiences and submit the A5 page (LBM Studio run by researcher – *Garden Shed Studio*). This practice is now an integral activity in all LBM Studios.

Another example of improvements due to this study occurred in the *Garden Shed Studio*. All students investigated and researched materials and fixings at a local hardware store, as well as resolving the budget and design. In previous LBM Studios, only a few students gained these experiences. This is a critical component of students learning in relation to the construction process and the improvement of their design process understanding. These examples of the practical implementation of findings demonstrate the pragmatic validity of this study.

To ensure that Kvale's approaches were comprehensive, Denscombe's (2001 pp. 213-214) checklist was also examined. It provides an overview of important issues that contribute to the validity of a research project. These issues, adapted to the needs of this project, are as follows (*references to the research project and other sources are also incorporated*):

a) **Avoid Oversimplification of Findings** (p. 213);

b) **Selection Process**: Reasonable selection process of LBM Studios and participants to fulfil the research aims;

c) **Impact of the Researcher:** Acknowledge possible influences in the data collection process by the presence of the researcher during observations and interviews, while outlining strategies to minimise and counteract this bias. Woods (1999) believes that "participant and non-participant observation, unstructured interviews or conversations ... key informants and studying documents ... leave the situation as undisturbed as possible" (p. 4). Many of these strategies are employed in this study. Lincoln and Guba (1985) suggest that the researcher has both a positive and negative effect on the interview process. The positive effect is that the researcher can respond to "changing situations with skill and sensitivity", though responses are open to misinterpretation (p. 107);

d) **Minimise other Potential Biases:** The initiators of this research project (SA UTas) specified that the evaluation methods be independent of the lecturers involved in LBM, to ensure that potential bias was minimised;

e) **Alternative Findings:** Demonstrate that alternative explanations/conclusions have been explored and enhance findings by triangulating alternative sources;

f) ***Respondent Validation*** (Silverman 1995, p. 156): have participants review and verify interview transcripts and findings. This occurred in **Study 2** and;

g) ***External Validity:*** "how do the findings and conclusions fit with existing knowledge area?" (Denscombe 2001, p. 214). This was unachievable as previous research evaluating LBM or D/B models in architectural education was not found, although the literature review did provide a preliminary comparison between the LBM Studios at the SA UTas and D/B Studios in North America (Chapter 3). In addition, to improve the rigour of this research

project, the observation method in **Study 1** was repeated to test and highlight any discrepancies in the data collection method.

In addition to Denscombe's checklist (2001, pp. 213-214), Guba suggests further strategies to minimise the impact of the researcher on the results. These strategies relate to the researcher being involved in the study site for long periods as well as maintaining persistent observations (1981, pp. 75-91). In both **Studies 1** and **2**, observations occurred everyday and every attempt was made to ensure that they were consistent through the course of the day.

4.5 Summary

In this chapter, the Illuminative Model, used to evaluate educational curriculum, is identified as an appropriate model for this thesis. The research methods of observation, questionnaire and interview were used in combination for **Studies 1** and **2** to 'triangulate' data collected and to ensure that the potential for researcher's bias was minimised. **Study 3** was developed later, in response to questions raised from the preliminary findings of **Studies 1** and **2**. An open questionnaire (**Study 3**) was administered to final year architecture students. Many of these students were past participants in **Studies 1** and **2**. This chapter concludes by detailing the measures taken to ensure academic rigour, by examining the 'reliability' and 'validity' of this study. The following three chapters, **Chapter 5**, **6** and **7** provide the data collection, analysis and results for **Studies 1**, **2** and **3** respectively.

Chapter 5: Study 1 - Data Collection, Analysis and Results

5.1 Introduction

This chapter describes, in detail, the observation, questionnaire and document methods used in **Study 1,** and their results. In each case, the description of the method includes the results, as the preliminary analysis of these results led to refinement of **Part B** of **Study 1**. **Study 1** comprises two parts, which represent two separate trials of LBM Studios. For example, the first section on observation describes the method used in the *Freycinet Furniture Studio*, its results and how this method was refined for testing the *Flat-pack Furniture Studio*. This format is repeated in the questionnaire section of **Study 1**.

Data collection methods for **Study 1** were designed in response to the three research questions (as identified in Chapter 3):

- **RQ1:** What is the Students' Level of Cognitive Engagement in LBM Studios?
- **RQ2:** Do Students have Consistent Learning Experiences in LBM Studios?
- **RQ3:** What Benefits do Students' Believe Result from Participating in LBM Studios during their Architectural Education?

5.2 Observations

5.2.1 Study 1A, Freycinet Furniture Studio: Data Collection, Analysis and Results

In this study, 14 students took the LBM Studio from second and third year. Their collective task was to design and build several resting points along a popular walking track for Parks and Wildlife Services, Tasmania (the client), at Freycinet National Park (FNP).

Data Collection and Analysis:

The observation method (a combination of *systematic* observation and *privileged active observer)* was selected to investigate **RQ1** and **2,** to identify students' activities in LBM Studios. *Systematic* observation (Denscombe, 2001) relies on the design and use of an observation schedule to quantify designated behaviours or activities. *Privileged active observer* (Mills, 2002) refers to the researcher position; in this case, the researcher may change from passive to active depending on the behaviour of the group being observed. Two main issues influenced the design of the observation schedule for **Study 1A**:

1. The requirement for the researcher to be able to move easily around the School Workshop and the walking tracks at FNP to assess students' activities. For this reason, data was recorded by hand, as in many cases it was impractical to use a laptop computer.

2. Clear identification of fields by which to record individual data in relation to student, activity and period (**RQ1** and **2**). As the students were a constant, their names headed the sheet. The time spent was recorded in the first column and along the row; the students' activities were sequentially marked (Appendix 5.1).

Burns (1997) notes that to gain a better understanding, "preparation is important". Before the commencement of this study, the researcher had been involved as a tutor and observer of three LBM studios. From this experience, the field of student activities was informed. However, this field did evolve in the first few classes and at the beginning of the construction phase. On the final presentation of the schedules (Appendix 5.2), students' activities were categorised as being Primary: Design Activities or Secondary: Production. A third category, Non-Participation, represented the requirement to record students' rest breaks. When they were away from the observation area of the School Workshop, this was recorded as 'unaccountable'. 'Unaccountable' was applicable to student observations and also to record the researcher's rest breaks. Generally, observations were at two or five-minute intervals, depending on the frequency of activity changes.

On the first day of observation, a supplementary recording technique was developed to describe the level of contribution that students made during classroom conversations, otherwise participants' records for *Discussion* would have been deceptively high. Each time a student contributed to discussion, a 'tally' mark was placed in their respective recording cell. 'Tally' marks were also generated if student inputs extended beyond 30-seconds. Marks were added and the amount of time was noted in either the *Listening* or the *Discussion* category.

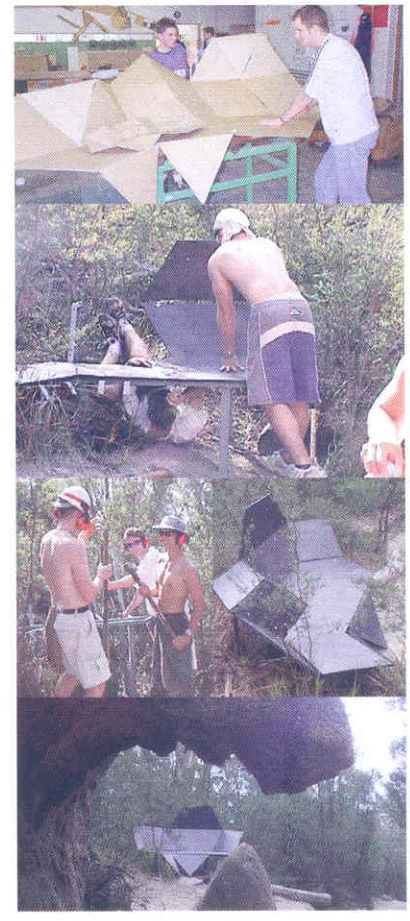


Figure 5.1: Feldspar Futon, Freycinet Furniture 2000

The primary role of the researcher was as an observer, but this activity did range from tutor to student peer. The structure of the LBM Studio as noted in **Chapter 3** is horizontal: students' thoughts are just as valuable as those of the lecturer or tutor. This observation approach was influenced by the *privileged active observer* (Mills, 2002) and followed recommendations from Angrosino and Mays de Perez (2000) that the researcher position may change instinctively according to the group's behaviour by taking part in the group's activities.

Data Results:

Overall, the observation of 14 students in the *Freycinet Furniture Studio* comprised 111 hours and 46 minutes, over 26 days. These hours represent student time on site, at client meetings, designing and constructing. This LBM Studio required students to be present in the School Workshop for at least 4 hours per week, but there was an expectation that students would also work another 4 hour session per week to be able to complete this project. The ramifications of this teaching structure were that the lecturer was available for consultation in the School Workshop two days of the week. This flexibility meant that documentation spanned from the first student beginning

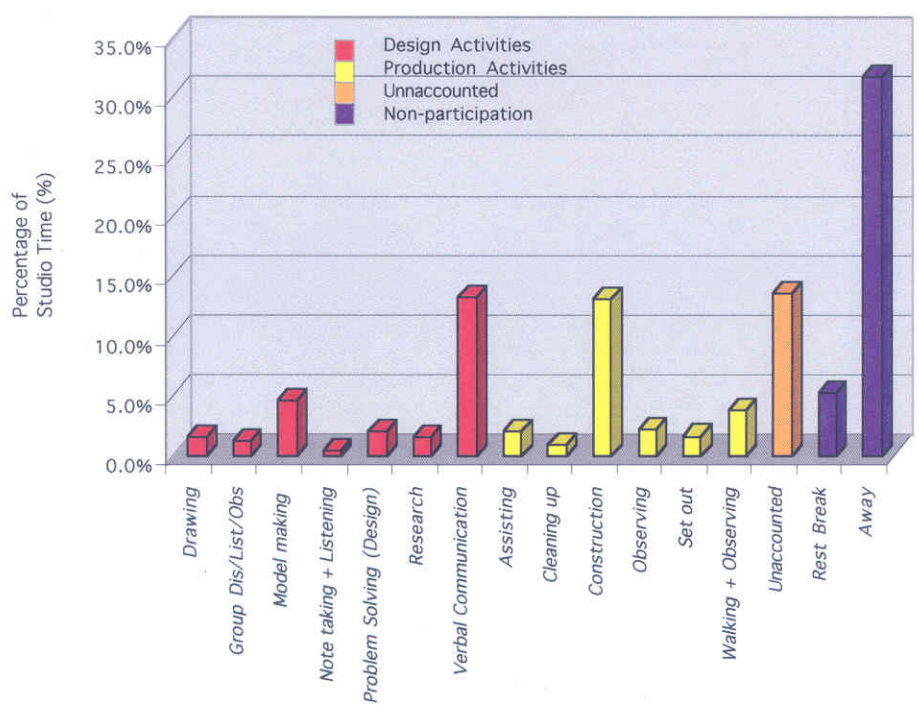
the project to when the last student finished. As a result, the level of *away* and *unaccounted* time recorded for students is significant, hence the need to record it.

(a) Comparison of the Typical Student Activities:

To identify and compare the 'typical' activities of students in the *Freycinet Furniture Studio*, students' activities were averaged (Figure 5.2). These calculations included only 11 students, as three students were regularly absent from the School Workshop. Their absences were due to failure to attend or working off-site at a Ceramic Workshop. The inclusion of their data would have distorted the results because their percentages for away and unaccounted were high.

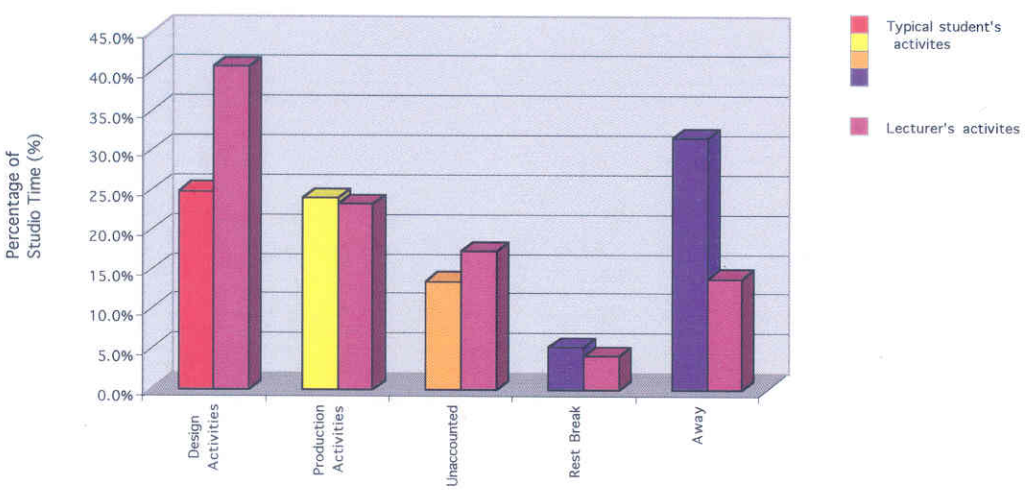
As discussed earlier, the high percentages recorded for away (31.8%), unaccounted (13.6%) and rest breaks (5.3%) were due to flexible studio time and the documentation period spanning from first to last student participating during the day. These categories have been excluded from the discussion that follows, to identify the activities that students spent most of their time on.

Figure 5.2: Typical Student Activities in **Study 1A**



The 'typical' student in **Study 1A** would spend most of their time communicating verbally (13.3%). This was a combined category, consisting of *discussion* and *listening*. The *listening* percentage was dominant (10%), and was a repercussion of group discussions, as only one person speaks while the others listen. The second most time-absorbing activity was *construction* (13.2%). *Construction* was another combined category that included *operating equipment, installation, sourcing materials, materials/tools* and *finishing*. The percentages for these categories were evenly distributed. *Model making* was the third most time - absorbing activity (4.7%). This seemed to be a logical progression, as *model making* assisted the process of discussing construction decisions. The fourth activity, *walking and observing* (3.9%) was in relation to the other activities a high percentage. This was peculiar to this particular LBM project, as students spent at least 5 days of the 26 on a mountainous walking track. *Design* was the fifth most time - absorbing activity (3.7%), which was comparatively low. This was a difficult category to identify and it may have been recorded as *discussion* or *model making*.

Figure 5.3: Comparison of Design Activities to Production Activities in **Study 1A**



(b) Design Activities versus Production Activities

The typical student spent an equivalent percentage of time on design (25%, categories include: *drawing, group discussion/listening/observation, model making, note taking and listening, problem solving, research* and *verbal communication*) and production activities (24.2%, categories include: *assisting, cleaning up, construction, observing, set out,* and *walking and observing)* (Figure 5.3). Design activities

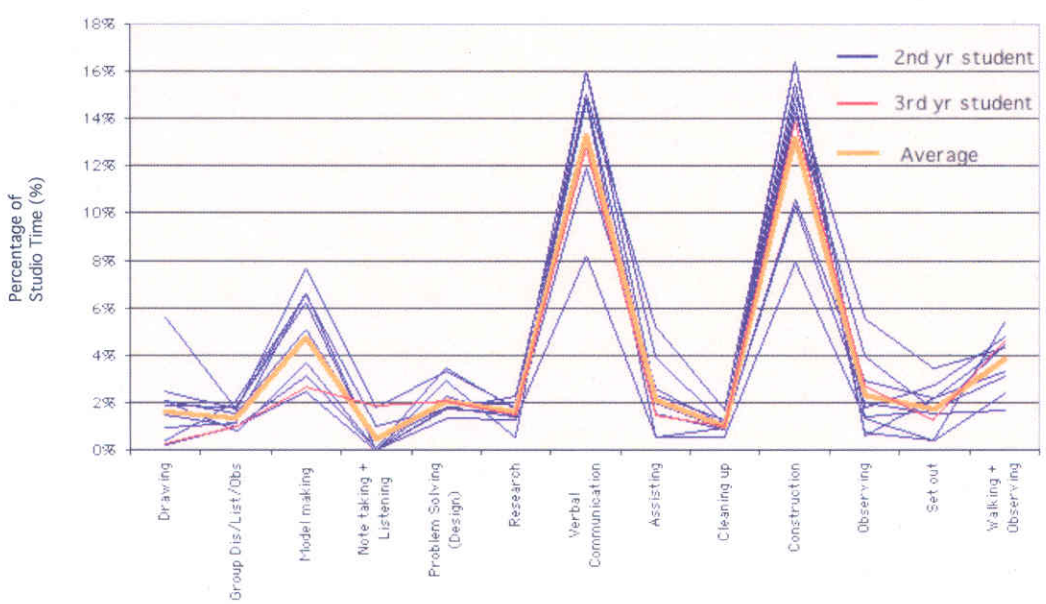
engaged students in more cognitive and higher-level problem solving activity than production activities, because Design activities require students to consider many overlapping issues from different perspectives "with a willingness to re-examine" and re-work possible design solutions (Biggs and Moore, 1993, p 188). In relation to Production activities, many involve repetitive motor tasks, which are considered low cognitive activities.

(c) Comparison of Students' Activities:

Figure 5.4 shows the percentage of time each student spent individually on each activity. The largest variations in experiences were in *verbal communication* (8%) and *construction* (8%). It is important to note that the typical student spent most of her/his time on these activities. Next were drawing (6%), model making (6%), and observing (5%).

The student with the lowest percentages in most categories belonged to a group of four. All of the other groups in this LBM Studio contained two or three members. This suggests that for the size of this installation it was possible for this student not to be fully involved, while the other members of the group were at 'typical' levels of participation.

Figure 5.4: Comparison of Student Activities in **Study 1A**



5.2.2 Study 1B, Flat-pack Furniture Studio: Refinement to Data Collection, Analysis and Results

The structure and teaching of the *Flat-pack Furniture Studio* differed from those of the *Freycinet Furniture Studio* (**Study 1A**). The *Flat-pack Furniture Studio* program consisted of three long-weekend (3 days) workshops and weekly design feedback. Unlike most LBM Studios observed, students were given the opportunity to design and build a piece of furniture for themselves, rather than contributing to a collaborative design and build project for a client. Another distinction was that students in the *Flat-pack Furniture Studio* were encouraged to design by drawing or model making, whereas students in the *Freycinet Furniture Studio* designed with models only.

Refinement to Data Collection and Analysis:

The recording method in **Study 1A** generated a large amount of raw data that required processing before analysis could occur. As a result, the second trial, **Study 1B**, incorporated direct electronic recording on a laptop computer. This was possible as this studio was held entirely in the School Workshop. The only other change made was a reduction in the number of students observed. The overall class size for **Study 1B** was 16, an unmanageable size to observe and record students activities every two minutes. Students from second and third years, international students and students repeating were selected, creating a sample size of 12. The data analysis method from **Study 1A** was also used in **Study 1B**.

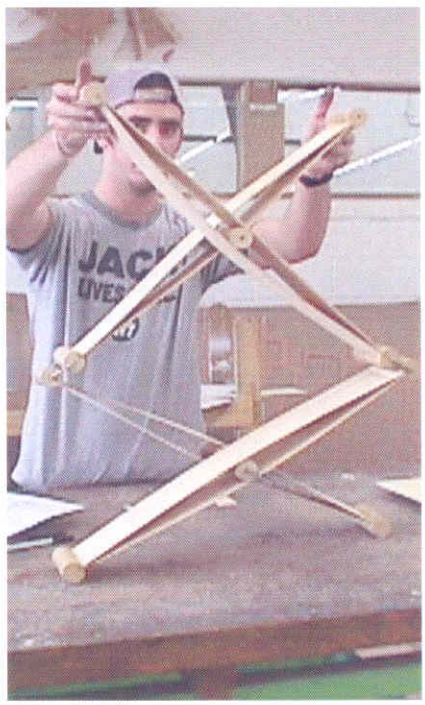
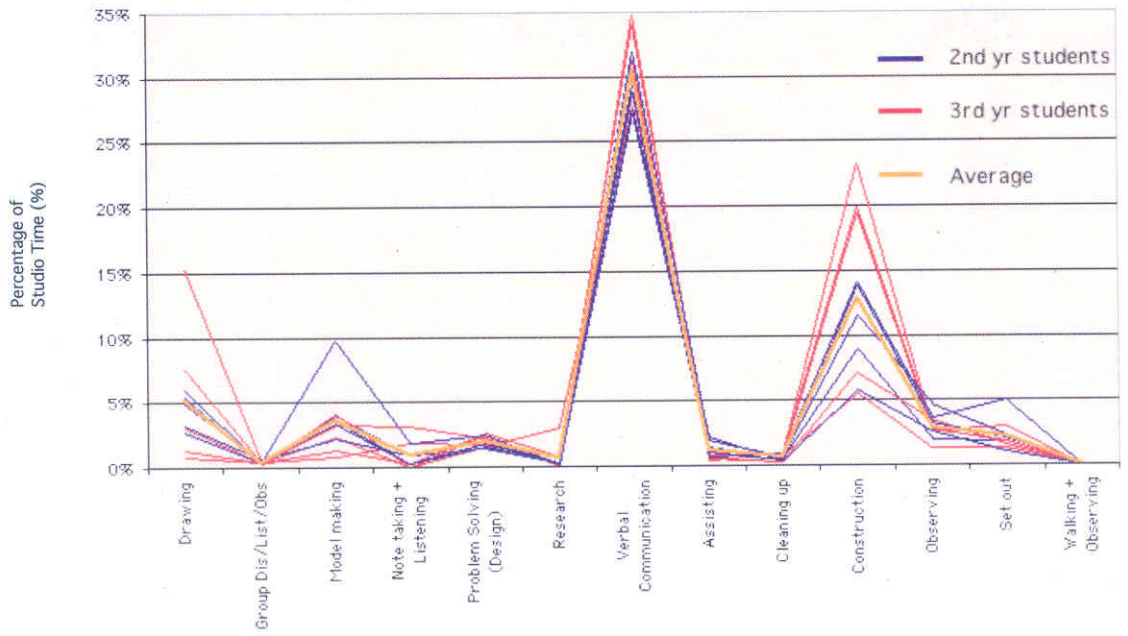


Figure 5. 5: Flat-pack Furniture Prototype 2001

Data Results:

Overall, students spent 50 hours and 46 minutes in the workshop making their piece of furniture and receiving design feedback over 14 days. Data collection occurred during this period only, as students were expected to design by drawing outside studio time and all students required additional time at the end of the semester to

Figure 5.7: Comparison of Second and Third Year Students in **Study 1B**



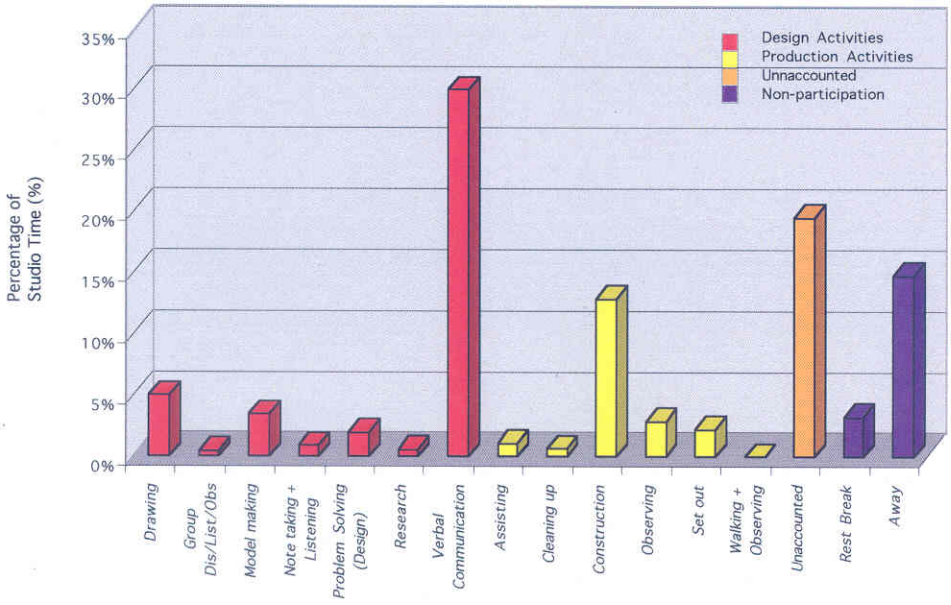
b) Comparison of Students' Activities in Study 1B

There were three large variations in the data on students' activities (Figure 5.7). The most significant variation was in the data on *construction* (17%). This is attributed to the students' decision to either construct their piece of furniture by hand or to use the CNC router (Refer to Appendix 5.4). Students who elected to use the CNC router registered, on average, 10% less in the construction category when compared with students constructing by hand. It was possible to make this comparison by average, as there was a similar number using each technique. Another factor contributing to the variation in construction time was the different experience levels. This LBM Studio was taken by equal numbers of second and third year students. The second year students had no previous LBM or workshop experience whereas the third year students were very familiar with School Workshop and LBM Studios. On average, a second year student drew more (6%) and constructed less (6%) than a third year student (Figure 5.6). The second years also had a lower attendance (6%).

The second most significant variation in students' activities was in time spent drawing (14%), then model making (9%). Both these variations were a result of a student's preference for drawing or model making. In the particular case of drawing, the student with the highest percentage (15%)(Figure 5.8) also had one of the lowest percentages for construction (7%). This relationship was reversed for another student

complete their piece of furniture and logbook for assessment. Only two students of 12 observed in **Study 1B** were excluded from the data results. These students did not fulfil an adequate level of attendance (50%).

Figure 5.6: Typical Student Activities in **Study 1B**



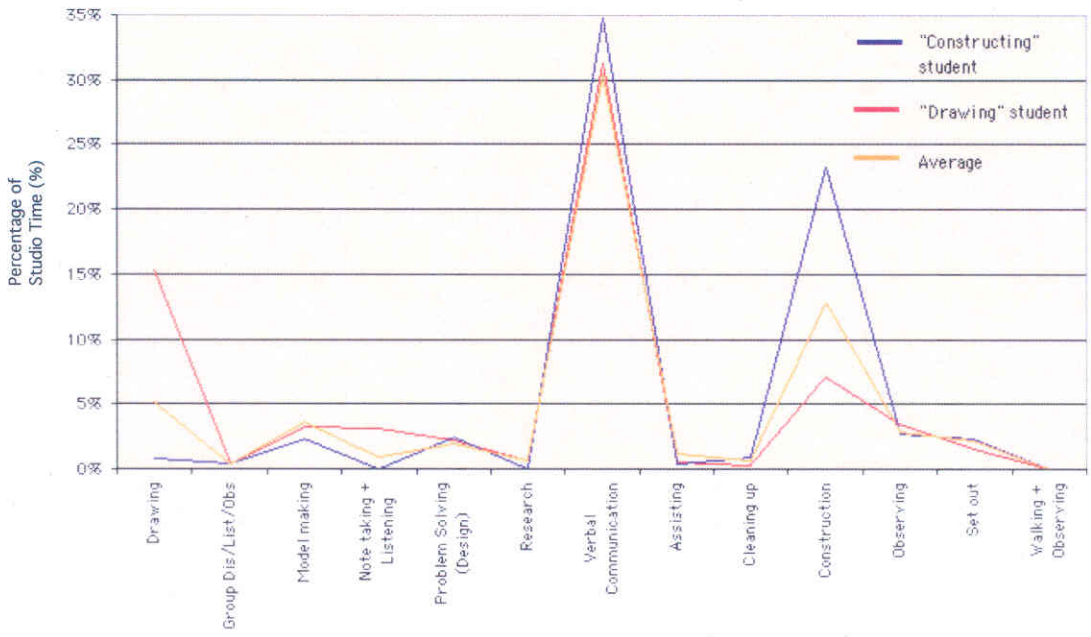
a) Comparison of the Typical Student's Activities:

In the *Flat-pack Furniture Studio*, the typical student spent most of his/her time *verbally communicating* (30%)(Figure 5.6). This activity was particularly high when compared with the other activities, because students received a dedicated feedback session each week from the lecturer. This feedback session did not involve any making activities. There were significant time reductions for the next time – absorbing activities, *construction* (13%) and *drawing* (5%). The fourth activity was shared between *model making* (3%) and *observing* (3%).

The typical student was absent from this LBM Studio for 15% of the time, and she/he was *unaccountable* for 20% of their time. This percentage was influenced by a number of students drawing on the computer in the Computer Laboratory, which is located away from the School Workshop but within walking distance.

with the lowest drawing percentage (1%) who spent the most amount of time constructing (23%). These two students were both in third year.

Figure 5.8: Comparison of Two Students and their Preference to Draw or Construct



It was significant to observe the level of drawing and model making to construction. Typically, architecture students are encouraged to use these methods to explore and resolve problems but in LBM Studio, the reliance on these methods is shifted to exploration with materials and construction techniques. LBM Studios are not 'demonising' the practice and value of drawing, but from past lecturers' experience students who feel comfortable drawing are less likely to engage with the process of testing and construction because they are unsure whether it will work. Whereas the aim of LBM Studio is to allow students the opportunity to test their knowledge and design ideas in the workshop so they can re-work their details and learn more about the process of assembling.

5.3 Questionnaires

5.3.1 Study 1A, Freycinet Furniture Studio: Data Collection, Analysis and Results

There were two main objectives in issuing the students with questionnaires:

1. To ascertain background information regarding the students' previous experiences with LBM Studios, year level, motivation to select LBM Studio and learning expectations; and
2. To ascertain whether the students' learning expectations were met or changed as a result of their participation in a LBM Studio (**RQ3**).

Data Collection and Analysis

These two objectives were addressed in separate questionnaires for **Study 1A** (Refer to Appendix 5.5). Students received the first questionnaire in their first class of semester in order to capture information regarding their motivations and expectations. The questionnaire was divided into three sections, which follows Burns' (1997) recommendations to "group items logically in coherent sections" and to sequence the questions. Burns suggests that the questionnaire begins with an introduction, followed by demographic questions, *warm-up* questions which are intended to be non - threatening, and finally the body of the questions (pp. 475-6). The questionnaire for **Study 1A** reflected this structure. The first section inquired about the student's background. The second section sought information on the student's level of expectations regarding learning experiences and the third section addressed their priorities. Both the second and third sections referred to a list of LBM learning experiences. This list originated from an initial analysis of LBM objectives and student feedback collected by a LBM lecturer, Gillian van der Schans, shortly before this study commenced (Appendix 5.6). The common learning experiences identified were by no means comprehensive but provided a sound foundation to begin investigations in this area:

- *Development of communications skills;*
- *Re-informing the design process by exploring construction;*
- *Development and appreciation of team working skills;*
- *Realisation of a scale model to 'actual' dimensions;*
- *Better awareness of the process of creating architecture;*

- *Ability to research and explore different techniques in fixing and combining materials;*
- *Ability to understand the capacity and structure of materials;*
- *Development of construction skills in the workshop; and*
- *Ability to understand the critical relationships in the formation of architecture.*

To reduce students' concerns about the privacy of their responses, a code was assigned to each student (Mills 2002, p64). This was marked on the questionnaires before they were handed out. This allowed responses from the first and second questionnaires to be cross-referenced, while retaining anonymity.

At the end of **Study 1A** and **1B**, students received the second questionnaire (Appendix 5.5 and 5.8) to record their reflections once the task was completed. The questionnaire was divided into three sections. Section 1 introduced further background questions concerning previous making experiences. Section 2 referred to the above list and asked students to indicate which skills or areas of knowledge had been enhanced. A similar question about which items were unique learning experiences followed, to verify responses, to the previous question. The third section contained a series of yes/no questions about the educational links between LBM and other architectural education units such as *Design Studio* and *Building Technology*. Other questions were concerned with the assessment of students' feelings towards the purpose of the project and its outcome, the overall class time, and whether they felt more confident and motivated to undertake another building project within the School or elsewhere.

In both questionnaires there was a predominance of closed questions, because "open questions ... demand more effort on the part of the respondents (which might well reduce their willingness to take part in the research)" (Denscombe 2001, p101). As Burns suggests, "the use of the questionnaire ... is based on one basic underlying assumption: the respondent will be both willing and able to give truthful answers" (1997, p472). Another advantage of selecting closed questions is that the data is pre-coded and uniform. This uniformity also suited the application of these questionnaires to other LBM Studios.

Data Results

This section summarises the main findings, for a complete set of data results refer to Appendix 5.5.

All 13 students responded to the first questionnaire. This group of students was experienced in LBM Studios, although 12 of the 13 students were only in second year. The second year students had previously participated in two separate LBM Studios in their first year of study. At least 46% of this group had elected to participate in another LBM Studio after first year. Most responded that they had selected another LBM Studio because it was of special professional interest. Typically, these students (80%) had previously made small items at home such as models, billy-carts or dog kennels. It is important to note this point, as these opinions, particularly in the second questionnaire, are from the perspective of students with experience in making.

At the end of the *Freycinet Furniture Studio*, 10 of 13 students responded to the second questionnaire. Overall, responses were positive to the yes/no questions. All respondents indicated they were confident and motivated to undertake another building project at the SA UTas or elsewhere. All 10 students thought that their emotional response to the project outcome affected their learning motivation. Most students (90%) agreed that they gained satisfactory learning experiences for the period (26 days) they spent in the School Workshop. Nearly every student (80% of the group) was excited by the project outcome; the other students felt it was satisfactory. A mixed response was received to the two questions asking whether students thought that their experience in this LBM Studio would assist them in their immediate design work or building technology studies: only 50% agreed.

In the first questionnaire, students were asked to rank the nine learning experiences according to importance (Table 5.1). The three most desired experiences were concerned with the overall process of designing and building:

1. *Ability to understand the critical relationships in the formation of architecture;*
2. *Better awareness of the process of creating architecture; and*
3. *Re-informing the design process by exploring construction).*

Table 5.1: Students' Responses to Nine LBM Learning Experiences from **Study 1A**

	First Questionnaire Ranked priority	Second Questionnaire Gained or Improved	Second Questionnaire Unique to LBM studios	Comment
1	Critical relationships	Critical relationships (70%)	Techniques to fix materials (70%)	Critical relationships, gained but not unique
2	Process of architecture	Construction skills (60%) Communication skills (60%)	Materials capacity (60%)	No matches, skills were gained or improved, but were not considered important in the first questionnaire. Technique to fix materials, Material capacity and Team working skills were considered unique experiences
3	Re-inform design by construction		Team-working skills (50%)	
4	Communication skills	Process of architecture (50%) Re-inform design by construction (50%) Team-working skills (50%) Materials capacity (50%) Techniques to fix materials (50%)	Re-inform design by construction (40%) Critical relationships (40%) Construction skills (40%)	Communication skills was the fourth learning priority, at least 60 % gained or improved their skills in this area, but thought this experience was mot unique to LBM. Alternatively Construction skills, were the least important to students, but 60% improved their skills & 40% thought it unique. In terms of the 2nd and 3rd priority, only 50% of the class improved or gained in these areas?
5	Materials capacity			Materials capacity 5th priority – unique experience
6	Team-working skills			Low priority but gained and consider unique by 50%
7	Techniques to fix materials		Process of architecture (30%) Realisation of scale (30%)	Technique to fix materials, low priority considered unique & gained by 50%. Process of Architecture & Realisation of Scale not gained or unique but vary in priority
8	Realisation of scale			Low priority, not improved & not unique
9	Construction skills	Realisation of scale (30%)	Communication skills (10%)	Construction skills lowest priority, but students improved their skills

*Note the nine LBM learning experiences have been abbreviated in this table, refer to Appendix 5.7 for clarification.

Students thought that the development of their construction skills was the least important learning experience to be gained from the LBM Studio, perhaps because they had gained this experienced in previous LBM Studios.
In the second questionnaire, students were asked to indicate if they had gained or improved in these areas. Only one of the three most desired learning experiences identified in the first questionnaire was thought to have been gained or improved in this LBM Studio (*Ability to understand the critical relationships in the formation of architecture*, 70%). The next two learning experiences that students thought they had gained or improved were skills related to construction and communication (the *development of construction skills,* 60% and the *development of communication skills,* 60%). In the case of construction skills, students in the first questionnaire indicated that this was not an important experience. The learning experience that was ranked last in this question was the *realisation of a scale model to actual dimensions* (30%). This learning experience was also considered low in the first questionnaire regarding importance. Again, this ranking may have been a result of these students being familiar with LBM experiences and therefore aware of this issue.

When students were asked if any of the learning experiences that they 'gained or improved' were unique to LBM Studios, their responses were not always consistent. Some students claimed that the learning experience was unique but believed they had not gained or improved in this area. Between 70% to 50% of the students indicated that learning experiences connected with material properties, detailing and team-working skills were unique to the LBM Studios.

In **Study 1A** there was no relationship between students' desired learning expectations and their reflections on what they had learnt or considered unique to LBM Studios.

5.3.2 Study 1B, Flat-pack Furniture Studio: Refinement of Data Collection, Analysis and Results

Refinement of Data Collection and Analysis

Both questionnaires were refined after the first trial in **Study 1A**. In particular, Section 2 of the questionnaire given at the beginning of the studio was re-worked. These questions assumed students had highly developed language skills in order to differentiate between the various responses. As a result of poor response to these questions, this section was removed from **Study 2** and the questions from Sections 1 and 3 were expanded (Refer to Appendix 5.8). In most cases, the initial intent of questions was maintained for subsequent trials, but the expression was clarified. The nine learning experiences, were reduced to eight as it was concluded that there was too great a similarity between the *better awareness of the process of creating architecture* and *ability to understand the critical relationships in the formation of architecture* (the later was removed). The choice to use closed questions was vindicated by the results since students in **Study 1A** were reluctant to expand their responses beyond multiple-choice answers.

Data Results

This section summarises the main findings, for a complete set of data results refer to Appendix 5.8.

All 16 students responded to the first questionnaire. This LBM Studio was taken by second and third year students in equal numbers. Three of these students were repeating second or third year. Experience levels in LBM varied according to year level. The second year students had no previous experience of LBM Studios. This was unusual as, over the previous four years, students entering second year had at least one experience of LBM in their first year *Design Studio*. In most cases, the third year students had completed three or four LBM Studios (approximately one per semester).

Students were divided in their response to a question regarding their motivation to select this LBM Studio. No relationship was identified between year level and motivation. In reference to previous making experience, 94% indicated they had

undertaken a wood - working subject at high school or college and at least 80% had previously made items such as models. Only 30% of this LBM class had previous experience in assisting with the construction of a house, and these students were from second year.

Interestingly, the student who displayed a preference to draw rather than construct (discussed earlier in the observation results) indicated on the questionnaire that he or she did not build, sew or make things prior to this LBM Studio. This student also described, in addition to the nine learning experiences, an objective to "gain confidence with machinery".

This group of students ranked the learning experience *understand the capacity and structure of materials*, as the most important on the list (Table 5.2). The other top-ranked desired learning experiences were: *better awareness of the process of creating architecture* and *re-informing the design process by exploring construction.* Most students from this LBM Studio did not complete the second questionnaire, as it was not a priority to them at the end of their busy academic semester. Informally students commented that they were disappointed with their final pieces of furniture and themselves.

Clearly the priority of learning experiences was similar in **Study 1A** and **1B**, except in **Study 1B** students were more interested in building materials and construction skills. This is most likely a result of the students' prior experiences in LBM Studios, as in **Study 1B** at least 50% of students had no previous experiences. These students also put less importance on developing their communication and team-working skills further.

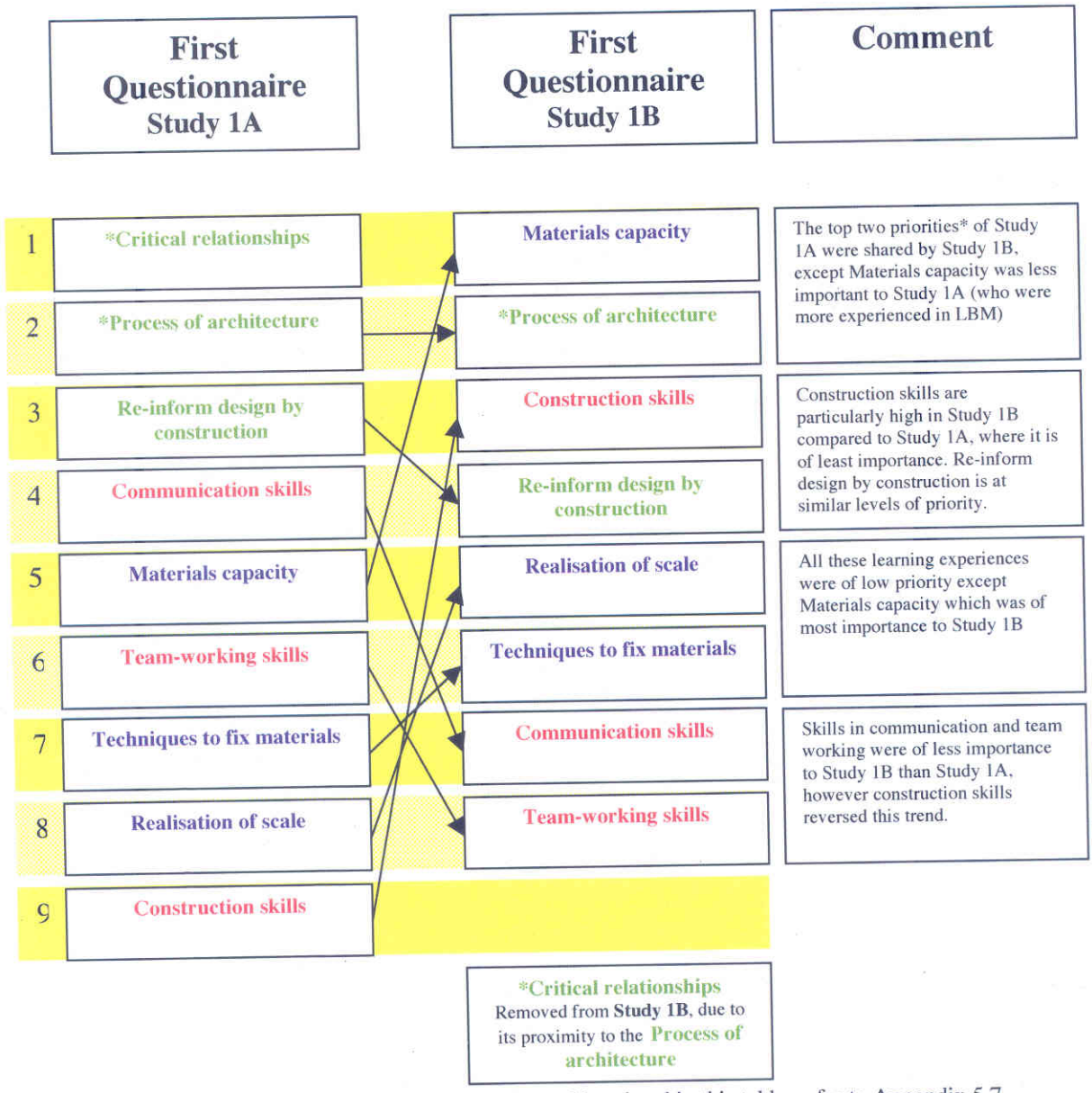
5.4 Summary

Both the observation and questionnaire results provided new insights into LBM Studios. Some of these influenced the development of Research Question 4 (**RQ4**) and subsequently have been incorporated into **Studies 2** and **3.**

a) Significant Observation Findings

With regards to **RQ1** (students' level of cognitive engagement), in **Studies 1A** and **1B** students spent an equivalent or higher percentage of their time in LBM Studios on design activities than on construction activities. Design activities were considered to engage students in more cognitive and higher-level problem solving activities than construction activities. Construction activities involved students' repetitiously cutting, setting out, sanding and painting materials.

Table 5.2: Comparison of Students' Responses to LBM Learning Experiences from **Study 1A** and **1B**



*Note the nine LBM learning experiences have been abbreviated in this table, refer to Appendix 5.7 for clarification.

The preliminary analysis of observation results from **Study 1A** indicated that students frequently discussed their design and decision making process with other group members. This created an excellent opportunity to learn more about students' design and decision-making processes in LBM Studios as they had to discuss these in groups. This does not occur in 'conventional' design studios. Following on from **Study 1**, **Study 2** involved the observation of students' conversation content and interpersonal responding style, detailed in the **Chapter 6**.

With regard to **RQ2** (consistency of students' learning experience), students' commitment and participation varied in a number of ways:

- Generally, students in **Study 1A** demonstrated a willingness to work outside 'normal' studio hours to complete the project for the client, with the exception of one student who had low participation levels in every category.
- In **Study 1A**, students experiences in the categories of 'communication' and 'construction' varied by up to 8%.
- In **Study 1B**, there was significant variation in 'construction' time due to students' choice to construct by hand or use the CNC router. On average, students constructing by hand spent 10% more of their time 'constructing' than students using the CNC router.
- The students in **Study 1B** also varied in time spent 'drawing' and 'model making', which seem to relate to their time spent in 'construction'. For example students with high percentages of 'construction' time had lower percentages for 'drawing' and 'model making' and vice versa.

b) Significant Questionnaire Findings

There were several significant findings. First, differences existed between student expectations and their later reflections on their LBM Studio experience (**Study 1A**). Second, students believed that the amount of time spent in the LBM Studios provided sufficient learning experiences (**Study 1A**). Third, more data was collated that verified students' learning experiences varied (**RQ2** - consistency of students' learning experience).

The student who preferred to draw than construct (**Study 1B**) indicated on the questionnaire that he or she had no previous making experiences and hoped to "gain confidence with machinery". This suggests that it is difficult for some students to

move from the familiarity of 'drawing' to 'construction', particularly when they are unfamiliar with the latter. It illustrates that a student's previous experiences in making, and their willingness to attempt new things may affect their participation. This highlights the importance of the facilitator's role in this process.

The most significant finding from **Study 1A** was that 50% of students believed that their LBM experience would assist their work in other units such as *Design Studio* and *Building Technology*. Conversely, 50% of the students did not establish a link between their experiences in LBM Studio and their other academic work. As this was the first result concerning this issue, it was unclear whether this was typical of most LBM Studios. This issue therefore, was investigated further in **Study 2** and **3** (**RQ3** - Students' beliefs concerning the benefits gained from LBM Studios and **RQ4** – linkage of design and construction concepts.

In **Study 2**, this issue regarding students' ability to link LBM knowledge and experience to those of other units is examined, but it is of secondary concern here. The primary focus of **Study 2** was to learn more about students' design and decision-making processes by observing their conversations. In particular, **Study 2** asks if students consider both design and construction concepts together, as claimed by LBM lecturers. **Chapter 6** describes the data collection method, analysis and results of **Study 2**.

Chapter 6: Study 2 - Data Collection, Analysis and Results

6.1 Introduction

This chapter describes the data collection methods used in **Study 2** to ascertain students' collaborative design and decision-making processes. The primary objective was to identify if students consider design and construction concepts together, as claimed by LBM lecturers. The teamwork structure of LBM Studios affords a unique opportunity to study conversations, as students have to disclose their strategies verbally to their team members, in contrast with the low level of verbal disclosure when individual projects are undertaken in formal design studios.

Research Question 4 (RQ4): Do Students Link Design and Construction Concepts in LBM Studios?

As stated, claims have been made that LBM Studios improve students' understanding of the relationship between design and construction, thus improving their ability to design buildings. The literature review indicated that in the United Kingdom and the United States, concerns have been raised that architectural students are not aware of differences between designing in an abstract and educational environment and designing in the pragmatic world of practice. This research aim will identify two issues: (i) whether the student activities in LBM Studios successfully encompass duality between design and construction; (ii) if LBM Studios alter or reinforce students' perceptions of the duality between design and construction. This is important as **Study 1A** indicated that only half of the students surveyed believed that their LBM experiences would inform their other academic work.

Study 2 involved three different data collection methods. Initially, **Study 2** consisted of observations and questionnaires. Interviews were added later to verify the data collected using questionnaires, thereby improving the rigour of the study. Each of these data collection methods is discussed in a separate section in this chapter, followed by the data analysis and results.

6.2 Observations

Study 2 took place in the summer semester (2001), during a 17-day intensive LBM Studio. It is important to note that the make-up of this LBM Studio differed greatly from a second and third year LBM Elective. This LBM Summer Studio was taken by 40 students from all year levels, including some recent graduates (Figure 6.1). These students came from various Australian schools of architecture and one from New Zealand. Their task was to collectively design and build two bus shelters for the local business district (funded by the Launceston City Council). The purpose of the observation method was two-fold. In addition to attempting to learn more about students' incorporation of design and construction thinking, this method also captured the main conversation themes for each day during the LBM Studio.

Figure 6.1: Bus Stops 2 2001

6.2.1 Data Collection

To ensure that the time requirements of this method did not extend beyond the time allotted for data analysis, preference was given to interpreting conversations directly into pre-determined categories via an electronic schedule, instead of tape recording them and undertaking the interpretation later (refer to Appendix 6.1). In choosing to reduce the amount of primary data collected, it was important to gain supporting information that clarified the content. For this reason, conversations were analysed and sorted into one of the three different categories. This process examined the content, its relationship to design or construction, and the interpersonal responding style (Johnson 1997, pp. 196 - 203). In the first two days of the study, the process and types of categories were refined.

To understand the selection process of three students for **Study 2**, it is necessary to briefly outline the group structure employed by this LBM Studio. The 40 students were split into two teams and each team was responsible for the design and construction of one bus shelter. Within each team, four sub-groups were developed. Their role was to each design and detail a zone of the bus stop. The zones included the roof, the primary structure, the walls and the seating. On the first morning, students 'picked from a hat' a piece of paper which indicated their groups. The selection process involved identifying a sub-group of three/four students whose members were discussing intensely their first design task.

Before **Study 2** commenced, students were informed that their conversation content would be recorded and analysed to better understand, the student LBM experience. Initially, the recording process was awkward as the researcher had to be in close proximity to hear the students' conversations. Students and staff were allowed to view the schedules at any given time. This was a deliberate strategy to allow them to see that the recordings were abstract representations of activities and that this data would not affect or be used to assess their participation.

During the construction of the bus stops, it was also difficult to hear and record conversations due to the noise and required ear protection. However these conversations were less frequent and in most cases, louder. Observing the three students became more difficult in the construction phase as they were then working in different locations and sometimes with other groups. For this reason, separate observations of each student occurred for one-hour intervals, throughout the day. As sessions were long (for example, some sessions began at 9:30am and concluded at 10:00pm) observations spanned the day with many rest intervals in between.

6.2.2 Data Analysis and Results

Student sample

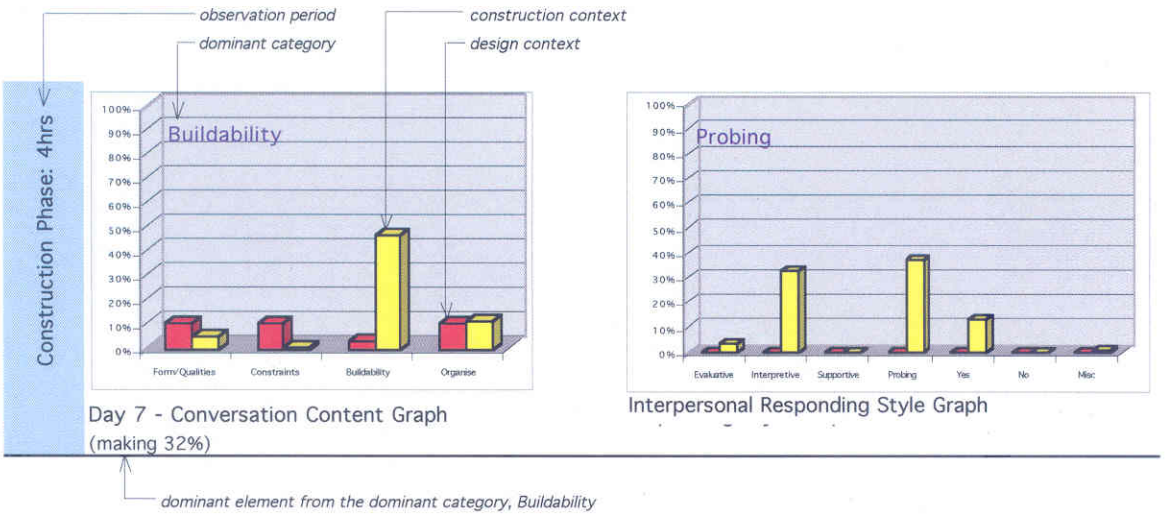
This LBM Studio had participants who ranged from having no experience of architecture, to graduate architects. The selection method of choosing a sub-group that was discussing intently their design process that first day resulted in experienced

students being selected for **Study 2**. All three students were about to commence their fifth year of architecture. Two had prior qualifications from previous studies. Despite their confidence and strong leadership skills, these students, like most of the group members, had limited building experience.

Data Analysis Process

In order to analyse the collected data (the main content of discussion for each day), individual graphs were constructed daily for each student observed (Appendix 6.2). Student results were kept separate from each other, as there were too many variables to present them together clearly. Further, there were too many variables to present conversation content and interpersonal responding style in one graph; accordingly, two graphs represent these issues for each day (Figure 6.2). Students are identified as '1', '2' and '3'.

Figure 6.2: Two Graphs Describing Student's Conversation Results for One Day



In interpreting these graphs, it was possible to compare students' discussions of design and construction concepts concurrently, in addition to the main conversation themes. The conversation content graph (Figure 6.2) indicates the percentage of time that each student spent discussing the four main content categories: *form/qualities, constraints, buildability*, and *organise*. Each category represented a group of elements. In the case of *organise* elements included: *integration/coordination, making, and time management*. Two coloured bars describe each category and these bars indicate the conversation related to a design (red) or construction (yellow)

context. At the top left hand corner of the graph the dominant category is noted. The element with highest percentage of time spent is indicated in brackets underneath the conversation content graph. This system was used both for the conversation content graph and the interpersonal responding style graph.

Results

This section will summarise the main findings. The full analyses of observations from **Study 2** are presented in Appendix 6.3.

a) Conversation content

Buildability and *form/qualities* issues discussed each day, demonstrated that design and detailing were concurrent processes. This also indicated that the teaching strategies to promote detail resolution as the design driver had succeeded. *Buildability* and *form/qualities* prevailed during the design phase. Issues of *buildability* grew in importance at the end of the design phase, with the requirement to build a 1:10 model to gain Council and Client (a group including representatives from the Mowbray Retailers Association, TT Metro Bus lines and Launceston City Council) approval. Throughout the construction phase, *buildability* issues dominated, and were surpassed by *organise* in the final two days only. *Constraints* was the least discussed category and recorded low responses, even through the design phase. This low response might explain problems that arose before installation (for example the size of the footing and its connection to the bus stop shelter had to be changed because its installation would have disturbed telecommunication cables below the footpath).

b) Interpersonal Responding Style

In general, there were two distinct trends that relate to the design and construction phases. For most of the design phase (Days 1-4), the students used one or two styles. The *evaluative* style was common to each student, indicating design discussions were influenced heavily by personal opinions. There was no pattern identified between the students regarding second most popular responding style. Once construction began, students' interpersonal responding styles were more evenly distributed. As indicated by the more detailed analysis (Appendix 6.3), this was thought to indicate student learning, as these experiences were new to the students and challenged their existing

framework of knowledge. Student 1 results, however, do not confirm this theory as his/her role was assisting others, which meant he/she responded with a high frequency of 'yes'. Students' conversations during the construction phase were often short or simply 'yes' when compared to the conversations held in the design phase. This was attributed to factors such as the act of making, industrial noise, ear protection being worn, limited experience, fatigue and getting to know the other members of the group.

c) Group work

The variation in student experiences, particularly in the design phase, may also relate to the different roles adopted and vice versa within the group. This is supported by the observed comment that there was some competition to assume a leadership role among the students studied, and within the larger team.

As noted in the more detailed analysis (Appendix 6.3) by Day 4 Student 1 assumed a supportive role. By drafting the approved design, Student 1 was distanced from the group's detailing debates and decisions. This conscious decision to withdraw from the debates continued through the construction phase. Students 2 and 3 vigorously debated decisions and the collaborative design model up to Day 5. On Day 6, Student 3 was absent, reducing his or her input into the design resolution. Student 3 had less involvement at the end of the construction phase due to injury and early departure. The need for a dominant leadership role became an insignificant issue once the design was approved and construction commenced. It appeared that the students' were less likely to debate each other's activities during construction because of their limited experience and knowledge in building, whereas, in the design phase students were more familiar with the process of debating and resolving design decisions.

6.3 Interview

The purpose of interviewing key participants from **Study 2** was to verify the interpretations of the observations results were accurate. It also provided another opportunity to gain a better understanding of their LBM experiences (and the benefits of this, of providing valuable substantive data).

6.3.1 Data Collection

The interviewing method selected was the In-Depth Phenomenological Based Interview Method (Seidman 1998), (discussed in section 4.2.2 c), which involves a series of three interviews over three weeks. Each participant was interviewed separately. This type of semi-structured interviewing allows the researcher to gain a better understanding of responses from the participant's perspective, as the first interview focuses on life history, the second interview concentrates on the details of their experience, and the third interview examines their reflection on meaning (Seidman 1998, pp. 9-21). Two out of the three students observed in **Study 2** (as well as two lecturers) accepted the invitation to participate in interviews. The lecturers were included in this process to expand upon the students' experiences in this LBM Studio, through their observations.

In the first interview, students recalled how they had come to study architecture and be involved in other design and making experiences before this workshop. The first interview concluded with the question: "How did you come to attend the Australian Timber Design Workshop [LBM Summer Studio]?" In the second interview, participants recalled their relationships with each other and other students, mentors, lecturers and the interviewer, providing further background information on whether the teamwork structure affected their individual learning experiences. The emphasis of the second interview was the reconstruction of memorable days or events. Participants were asked to explain these memories in a way that did not contain opinions or judgments.

Interpretations of the observation findings (Appendix 6.3) were emailed to participants after the second interview, to be read before the third interview for their feedback. The third interview required participants to reflect on the meaning of their experiences in LBM Studio by answering two questions. The first question asked about their understanding of their design process and their attitude to architecture, acknowledging their recollection of previous experiences in making and the LBM Studio. The second question asked where they saw themselves going in the future with architecture and their design process. Finally, participants gave their feedback on the accuracy of the interpretations extracted from studio observations.

The student interviews occurred over the telephone, as both interviewees were resident outside Tasmania.

6.3.2 Data Analysis

All interviews were tape recorded and transcribed. Advantages to creating transcripts of interviews include the elimination of errors caused by reliance on intuition and recollection (Heritage 1984, p. 238).

Miles and Huberman (1984) suggest marking interesting passages in the transcripts to reduce the amount of material for presentation (in Seidman 1998, p. 101). They put forward two options as how to further reduce this material and methods to describe key interview data. The first option is to develop participant profiles and the second option is to categorise passages into thematic connections by coding. The second option was preferred as the first option of developing participant profiles would be cumbersome for the reader to make links readily between their experiences, thereby affecting the quality and validity of data (Seidman 1998, pp. 101-102).

Other recommendations made by Seidman (1998), and employed in this study, are to work with paper transcripts before transferring them to the computer, and to create categories from reading selected passages. The coding process was made less complicated as there was a manageable amount of material from which to identify recurring themes.

6.3.3 Data Results

The analysis of the interview transcripts is presented in two sections. The first section outlines concerns about data collection, such as the effect of the presence of the researcher during the observation and interviews. This section also refers to the participants' appraisal of the observation results for **Study 2**, to clarify whether these interpretations are an accurate reflection of their own experiences. The second

section refers to participants' recollections and application of their LBM experiences, in terms of three different themes:

- *The link between design and construction (**RQ4**);*
- *The application of LBM to other work situations; and*
- *The impact of teamwork on their LBM experiences.*

Issues related to data collection

a) The effect of the researcher's presence

Comments suggest that the students were initially conscious of the researcher's presence, but with time became less aware of their own actions and behaviour and more relaxed in the researcher's presence:

> *...you were just always there... to begin with, you think I'll have to be careful with what I was saying and then, after a while you were just always there, so you, just became part, of the day, as far as what you were writing and typing. And it was also useful because I use to use you as a sounding board for some of my opinions* (Student 2).

Student 1 suggested that the researcher's presence might have *initially* influenced the amount that they contributed to the group dialogue but this lessened over a few days:

> *The fact that I'm not aware of being apprehensive in the first place may be an indicator... I mean obviously your attitude changes once you become more relaxed with the people around you, but it wouldn't have affected what I said or the way that I behaved, ... it would've affected how much I said* (Student 1).

Both lecturers were supportive of the research work in the LBM Studio. Lecturer 1 believed the researcher was "...very unobtrusive... as someone collecting information from students." Lecturer 2 noted "it's difficult for me sometimes (referring to relationship with the researcher) because I know that I have to distance myself so that ..." the research is not compromised.

It is also important to acknowledge that the relationships and interactions between students, lecturers and the researcher had significant effects on their LBM experiences. This will be further explored in the following sections. A full description of each participant's relationship with each other is included in Appendix 6.4.

b) Participants' appraisal of observation results

Both students felt that the observation results were an accurate interpretation of the design and construction phase. Student 1 was concerned by the reference to their participation within the sub-group,

> *... if I'm going to be honest with myself, it's probably a reasonably accurate depiction of what it was like... what I think annoys me about myself, it takes me too long to step back out of it (referring to participation in a group of unfamiliar people).*

Student 1 thought that in new experiences you should be more willing to "...stick your neck out and you'll learn more that way.... [I]t's an accurate interpretation..."

Student 2 also thought that the observation results were accurate but in recalling a LBM experience later it became evident that he/she disagreed with a statement. The statement questioned by Student 2 was, the *need for a dominant leadership role became an insignificant issue once the design was approved and construction commenced.*

> *Between the three of us there was probably less of discussion and more assimilation in the latter period because I felt that we ... disbanded and became sort of involved in other things, ... you say there was no need for dominant leadership, it became insignificant, I don't know if I'd necessarily agree with that. But maybe you're talking about dominant leadership with the three of us.... [I]'d say we all took on a sort of sub-leader group within the large group* (Student 2).

In Lecturer 1's opinion, the observation results were also an accurate record of events.

> *... it seems that's the way the actual program went....[j]ust seeing how they swapped from a design focus to a making and an organisation focus.... [T]hat's a fairly true description of what happens in the process* (Lecturer 1).

With regard to the interpretation of students' behaviour and participation, Lecturer 1 agreed that Students 2 and 3 were dominant within the sub-group during the design phase:

> *Oh, most definitely, ... they wanted to debate probably more than actually improve the design.*

> *... there were moments where ... the two dominant figures would hijack another group to form a bigger body so they could come back to the debate with a stronger unit in a stronger position. So a lot of gameplay ... I think in the end they did exhaust themselves, ... but as soon as they did let go, I think both of them were fairly much enjoying it in the making stage* (Lecturer 1).

Lecturer 1 thought that Student 1's contribution and interaction with the group was more mature. This interpretation differed from the preliminary analysis of the **Study 2** observations, which suggested that Student 1 receded from the group due to the dominant leadership styles displayed by Student 2 and 3.

> ... I don't necessarily see that position as recessive, because in most learning-by-making programs, the person who records all the critical dimensions becomes a key figure. They become the reference point for everyone, ... (Lecturer 1)

Themes related to their LBM experiences

a) Link between Design and Construction

This theme relates directly to **RQ4**, the integration of design and construction concepts. Only students were asked in the interviews, "Did the LBM process mean that you dealt with design and detailing issues concurrently?" Both answered affirmatively. Student 1 qualified his affirmation: "compared to anything that I've ever done before, I would have to say definitely yes" (refer to appendix 6.5 for more details).

b) Application of LBM Experiences into Other Work

This theme was incorporated in the final interviews in response to questionnaire results from **Study 1A** (which indicated that half the students thought that the LBM experience would not assist their *Design Studio* or *Building Technology* studies).

Both students' responses indicated that they found it difficult to apply their LBM experiences to their design projects due to the large scale and complexity of these projects. They did indicate that the LBM experiences would be useful in other circumstances, such as in the design of a house or room. As students explained their responses to the researcher, they discovered more connections and considered potential applications of skills gained during this experience (refer to Appendix 6.6 for more details).

Lecturer 1's response to the finding that students found it initially difficult to apply their LBM experiences to their own design work, was:

> *I suppose they may see a problem with scale, because the buildings are of course all small-scale buildings, but ... I still believe the same principles apply whatever the scale. Even if the experience is just being more conscious of the way, a bigger building is detailed. Often students design a larger building without any making experience, without realising that there are details to consider: there's details everywhere to consider.*

Lecturer 1 also elaborated upon the connection of LBM Studios to other units. At UTas, many student experiences in LBM Studios are referred to in other units to highlight connections between design, theory and construction. Finally, Lecturer 1 suggested some students may not realise the possible application of LBM knowledge and skills until they have worked in the architectural profession (though in this case, the two students interviewed were working part-time in architecture firms).

c) The Impact of Teamwork

In the interviews, participants were not asked directly about their teamwork experiences. However, many responses detailed the impact of teamwork on their LBM experiences, which were both negative and positive. The collaborative design process appeared to challenge both students. In their descriptions, they began by describing their frustration during the design phase because of the collaborative structure but at the end of the studio both felt positive about their experiences (refer to Appendix 6.7 for more details).

Student 1 suggested that his/her LBM experience would have been different if he/she had worked with a group of people, with whom he/she was comfortable with or if the project was an individual activity. Student 2 and Student 3 affected Student 1 interaction due to their strong presence and design positions. Despite this concern (of participating actively within his group), Student's 1 most memorable experience from the LBM Studio was the teamwork during the assembly of the bus shelter. "I thought it was quite magic. It was a bit of an adrenalin rush at the time" (Student 1). Student 2 also recalled favourably that "...the group interactions, were, significant experiences " despite his/her acknowledgment that he/she had attempted to assert leadership in the other sub-groups, to a mixed response.

When Lecturer 1 was asked if there were areas where the LBM pedagogical model could improve, his/her response focused on making the students' transition to collaborative design less painful. In many instances students find collaborative design challenging, as it differs significantly from previous experiences in the 'traditional' design studio.

> *Each learning-by-making program has shown that... (collaborative design process)... is more painful for an older student than a younger student. So it's almost like trying to remould their perception of architecture, ... I just, I don't know how to make it less painful and how to make the student trust you more and believe that their design will be fine in the end ... it's quite traumatic seeing them right on the edge.*

> *I remember seeing Student 2 at some points looking* **so** *down and out ... Hopefully they may realise in the future that the design phase wasn't as precious as they first thought it was* (Lecturer 1).

d) Other Themes

The purpose of this interview series was to illuminate student experiences through the studio observations, but many valuable descriptions of the LBM pedagogical model and process resulted (refer to Appendix 6.9, for interview transcripts). Both students and lecturers discussed their positive experiences of designing by model making. In addition, Lecturer 1 gave useful insights into transcripts the following questions:

- why the LBM Studio brief was initially divided for groups?;
- why drawing is discouraged in the design phase (model making is preferred), but is used to document the building once it is completed?;
- how to assist students who lack confidence?;
- how to deal with strong personalities in a group?;
- how to get students out of the design phase and into making?;
- what students should gain from LBM experiences?; and
- what is the future value of LBM Studios at UTas for students?

As these questions were beyond the scope of this study, these responses are detailed in Appendix 6.11 (Transcribed interview with Lecturer 1).

6.4 Questionnaires

The questionnaires designed for **Study 1** were also used in **Study 2** to expand the findings on LBM Studios. The refinement discussed in Section 5.3.1 describe the data collection and analysis process used in **Study 2**.

6.4.1 Data Results

These section summaries the main findings for a set of the complete results refer to Appendix 6.4. Of the 40 students enrolled, 39 completed the first questionnaire. The student group was diverse, ranging from students who had just completed their first year of architectural studies to graduates (Figure 6.3). Some students had studied another course before commencing architecture.

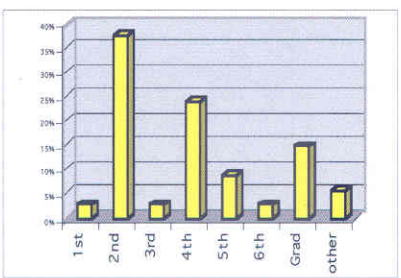


Figure 6.3: Graph of Different Year Levels of Students who Participated in Study 2

Of this group of 39 respondents, 87% had never participated in a LBM Studio. These students mostly chose to participate because it was of special interest to them and they wanted to gain academic credit; all the remaining responses were due to special interest in the LBM process. Typically, these students had made things in the past such as models. When questioned further about their previous making experiences, 40% had been physically involved with a complex building project such as a house. Students expected that the most important learning experience that they would gain from their LBM Studio was a *better awareness of the process of creating architecture* (Table 6.1). The other top ranked responses were: *re-informing the design process by exploring construction* and *ability to understand the capacity and structure of materials.*

In the second questionnaire, 30 out of the 40 enrolled students returned a completed questionnaire. Their responses were overwhelmingly positive about the LBM experience. The most significant responses related to students' opinion that the LBM

experience would assist their future design work (100%) and enhance their understanding of building construction (93%). Most students felt confident and motivated to undertake another building project (97%). Approximately 80% of respondents felt that their original learning expectations had been met and thought that the amount of time spent in the LBM Studio had resulted in a satisfactory learning experience.

Table 6.1: Students' Responses to Nine LBM Learning Experiences from **Study 2**

First Questionnaire Ranked priority	Second Questionnaire Gained or Improved	Unique to LBM studios	Comment
1 Process of architecture	Materials capacity (67%) Construction skills (67%) Communication skills Realisation of scale (67%)	Realisation of scale (53%)	The only match between the three questions is that participants thought that they gained an ability to realise scale from LBM and thought it unique, despite it being ranked the least important. The gained or improved column also included Construction
2 Re-inform design by construction		Materials capacity (47%)	Materials capacity is high in all three columns. Construction skills are also high in the 2nd and 3rd column.
3 Materials capacity		Construction skills (43%)	
4 Construction skills		Team-working skills (37%)	Communication skills were considered semi-important, in terms of gained or improved. Students indicated this to be at the top of their experiences. It was not considered unique to
5 Communication skills	Re-inform design by construction (63%)	Re-inform design by construction (33%) Process of architecture (33%)	
6 Team-working skills	Team-working skills (60%)		Team-working skills across the board were
7 Techniques to fix materials	Process of architecture (43%)	Techniques to fix materials (27%)	Techniques to fix materials were also low.
8 Critical relationships	Techniques to fix materials (40%)	Communication skills (20%)	Critical relationships were unsupported by this LBM Studio. In **Study 1A**, this was a high priority.
9 Realisation of scale	Critical relationships (37%)	Critical relationships (10%)	

*Note the nine LBM learning experiences have been abbreviated in this table, refer to Appendix 5.7 for clarification.

Sixty percent of respondents indicated that they had gained or improved their knowledge in at least 6 of the 9 learning experiences (Table 6.1). Only 50% of respondents believed that one of the learning experiences, the *realisation of scale model to actual dimensions,* was unique to LBM Studios. This learning experience was ranked the least important in the first questionnaire, regarding students' expectations, suggesting that students' previous experiences in units other than LBM studios had not enhanced their ability to comprehend size and scale.

6.5 Summary

The main aim of **Study 2** was to further investigate student activities in a LBM Studio; in particular, whether these experiences encouraged students to consider and incorporate design and construction concepts (**RQ4**). The key findings from the observation, interview and questionnaire methods are outlined below.

a) Observations

- Analysis of the conversation content suggested that design and construction (detailing) concepts were considered concurrently through the LBM process, (**RQ4**) as issues of *buildability* and *form/qualities* were discussed each day.
- Analysis of the interpersonal responding style indicated that students used one or two styles during the design phase; the most common style was *evaluative*. The second style differed for each student. The *evaluative* style indicates that discussion during the design phase was influenced heavily by personal opinions. Once the construction phase began, students' interpersonal responding styles were more evenly distributed. Students used a variety of responding styles and did not rely on *evaluative style* as in the design phase. This suggests that students were more challenged as they asked more questions, clarify items as well as suggesting alternatives.

b) Interviews

The interview method provided invaluable substantive data from both the students and the lecturers involved in this LBM Studio.

- The interviews verified the observation results. Preliminary findings were an accurate interpretation of the students' and lecturers' perspectives of their LBM experience. However there are two exceptions which are worth noting:
  - First, Student 2 believed that the group (consists of Student 1, 2 and 3) continued to display dominant leadership into the construction phase, but each of them became leaders of other sub-groups. The preliminary findings suggested that leadership contention between the three students lessened in the construction phase because they had less experience on which to draw.
  - Second, Lecturer 1 believed that the description of Student 1 as passive and receding in the group was inaccurate, as the role of recording critical dimensions meant that this person became an important reference point for all other students to consult during construction.
- In terms of **RQ2** (Section 3.5), consistency of students' learning experiences, the interview results indicated that students' involvement were sometimes negatively affected by the collaborative design process and teamwork structure (yet students still responded positively, despite the problems).
- Another issue that arose in **Study 1** concerned students' ability to transfer the experience and skills developed in LBM Studios to other situations or units. Students interviewed in **Study 2** initially found it difficult to transfer the impact on or benefit of their LBM experiences to their own work due to issues of scale, building complexity, and material selection, but through discussion were able to identify potential applications (**RQ3**).

c) Questionnaires

- The response to questionnaires in **Study 2** showed overwhelmingly that students thought that LBM experiences would greatly assist their future work in *Design Studio* and enhance their construction knowledge (**RQ3**).
- At the end of the LBM Studio 67% of participants had gained or improved their ability to *realise scale from actual dimension* and 53%thought it the most unique of the learning experiences afforded by LBM. Initially, participants had ranked this learning experience as the least important.

The findings from **Study 2** provided detailed information regarding student learning experiences, group interactions and students' understanding of the relationship between design and construction. However, a contradiction emerged between the findings of **Studies 1** and **2**: only half the students in **Study 1** believed that LBM knowledge was useful in other units whereas in **Study 2**, nearly all the students thought that LBM knowledge would be assist their future work. It was unclear from these two studies whether students thought that LBM was of benefit to their educational development. Thus, **Study 3** was developed to pursue this issue in more detail (**RQ3** - Students' beliefs concerning the benefits gained from LBM Studios). **Study 3** asked final year students from SA UTas to reflect on and assign meaning to the value of LBM Studios during their architectural education. The methods and results of **Study 3** are discussed in **Chapter 7**.

Chapter 7: Study 3 - Data Collection, Analysis and Results

7.1 Introduction

At the conclusion of the research stage for **Studies 1** and **2**, it was apparent that many issues remained unclear, including whether or not students' thought that LBM experiences would be beneficial to their study in other academic units and applicable elsewhere. This issue was addressed in **Study 3**, initiated one year after the initial period of data collection. This chapter describes the method, analysis and results of this final study. Questionnaires were used for data collection, in order to shed further light on the existing data from **Studies 1** and **2**.

7.2 Questionnaire

In comparison with the previous use of questionnaires in this research, **Study 3**, in particular, used open questions to solicit detailed responses in the participants' own words. The aim was that this would assist the process of identifying issues that hinder the recognition or application of LBM knowledge to other units. The initial findings from **Study 2** suggested there were a number of issues that made it difficult for students to transfer their LBM experiences to other situations. The **Study 3** questionnaire also provided an opportunity to gain a better understanding of what students believed they gained through participating in LBM Studios (**RQ3**).

In 2003, it was clear that the fifth year class provided the most suitable candidates, as many of these students had participated in the earlier studies. These students were also in the best position to reflect upon the value of LBM Studios to them as they were in their final year of architectural education and about to seek employment (or had in some cases already worked in an architectural practice during holidays or during the year in a part-time capacity while studying).

7.2.1 Data Collection

The use of open questions ensured that the students' points of view concerning LBM Studios were documented in the results because prior to **Study 3** most students had not been given this opportunity (Burns 1997, pp 473, 479). Although this type of data would be time consuming to analyse and code, it was anticipated that the quality of individual responses would warrant the effort (Denscombe 2001, p101). In the previous **Studies**, closed questions were used as it was a concern that students may have difficulty in considering the immediate effects of a LBM Studio on their architectural education. By **Study 3**, these students had become familiar with evaluating and communicating these issues.

To ensure the students would respond to the questionnaire, only six questions were asked, and they were evenly spaced over three pages (Appendix 7.1). As in previous questionnaires, a short introduction was provided on the Informed Consent Sheet (Appendix 7.2). There were six main questions. The first question asked how many LBM Studios they had participated in and sought the respective LBM Studio details. The second, third and fourth questions focused on what respondents thought were the most valuable skills or knowledge from LBM Studios and whether these were applicable to their current or future work (refer to Appendix 7.1). The fifth question asked whether student experiences in LBM Studios were more applicable to small or large-scale projects. The intention here was to highlight if students were extracting general principles from LBM Studios regardless of scale. The sixth question asked whether their LBM experiences provided insight into why the design process should incorporate construction considerations early in the process. These responses were expected to supplement and clarify the responses gained from **Study 2**.

7.2.2 Data Analysis

The results from Question 1 facilitated the categorisation of participants into three groups. These groups represented the number of LBM Studios undertaken by individual students (Table 7.1).

Group and participant number	Group 1 (14)	Group 2 (8)	Group 3 (15)
Participants have experienced:	1 LBM Studio	2-3 LBM Studios	4 or more LBM Studios

Table 7.1: Classification of Participants into Groups According to the Number of LBM Studios Undertaken.

In Group 1, the majority of students' experience in LBM Studios was a 4-day exercise in fourth year (*Theory in Design*). This 4-day exercise constituted a new type of LBM Studio as it also incorporated architectural theory. In this new hybrid format, students pursued architectural theory through a small built project. It was important to separate this group of students from the others, as this was not a typical LBM Studio. These students would not have received the same opportunities afforded to students in a typical LBM Studio, such as client interaction and feedback and the constraints of placing a small building project in a public location. Further, they had more time to develop design and detailing ideas in the School Workshop.

The other two groups were formed by the identification of the average number of LBM Studios that a student had participated in by final year. The average was four LBM Studios. Only a few students had participated in more than four. These participants became Group 3. The eight remaining students became Group 2, as their experiences were different from Group 1 and typically did not match the number of experiences held by Group 3. Results were organised by group association.

Question 2 was treated differently to the other questions, as a more sophisticated coding system was required to gain a detailed description of what participants thought was educationally valuable to them from their LBM experiences. A random sample of seven questionnaires from the three groups was analysed, to create a list of codes that would be applied to the remaining questionnaires. In applying these codes to the remaining questionnaires only two new codes were introduced, as they did not fit appropriately within the existing list of codes (D/B – model and D/B - computer router). These codes were re-appraised, once the results were tallied (Appendix 7.3).

The analysis method for Questions 3 to 6 identified responses at a more basic level of 'yes'/'no', to gain an appreciation of whether students agreed with the question or not. Section 7.2.3 also includes examples of students' responses to each question to reveal their thoughts towards LBM.

7.2.3 Data Results

Question 2:	Reflecting over your architectural education at UTas, what was the educational **value** of Learning-by-Making projects for **you?** (i.e. design and build a small object)

In general, participants agreed that their collaborative Design/build experiences of translating ideas to the built form were the most valued learning experience (D/B – process, 48%, Appendix 7.3). The next most valued learning experiences knowledge of materials, construction processes and tools (all 28%). The fifth most valued learning experience was teamwork skills, which received a quarter of the students' support (25%).

Participants' priorities varied according to their level of experience (Figure 7.1). The greatest variation was in the category of theory and practice (10%); Group 1 valued this more than Group 3. This variation can be attributed to Group 1's LBM experience in a *Theory in Design Studio* which gave participants only four days to design and build an object within a team of 10 people. It appears that this experience also taught Group 1 members much about teamwork skills. In comparison, other groups' responses were lower for teamwork skills (overall variation of 7%). More experienced participants in LBM Studios placed greater value on the Design/build categories of tools, construction process and detailing than the participants from Group 1 (variation of 8%). Other significant variations occurred in the Design/build categories of physical realisation (9%) and process (8%).

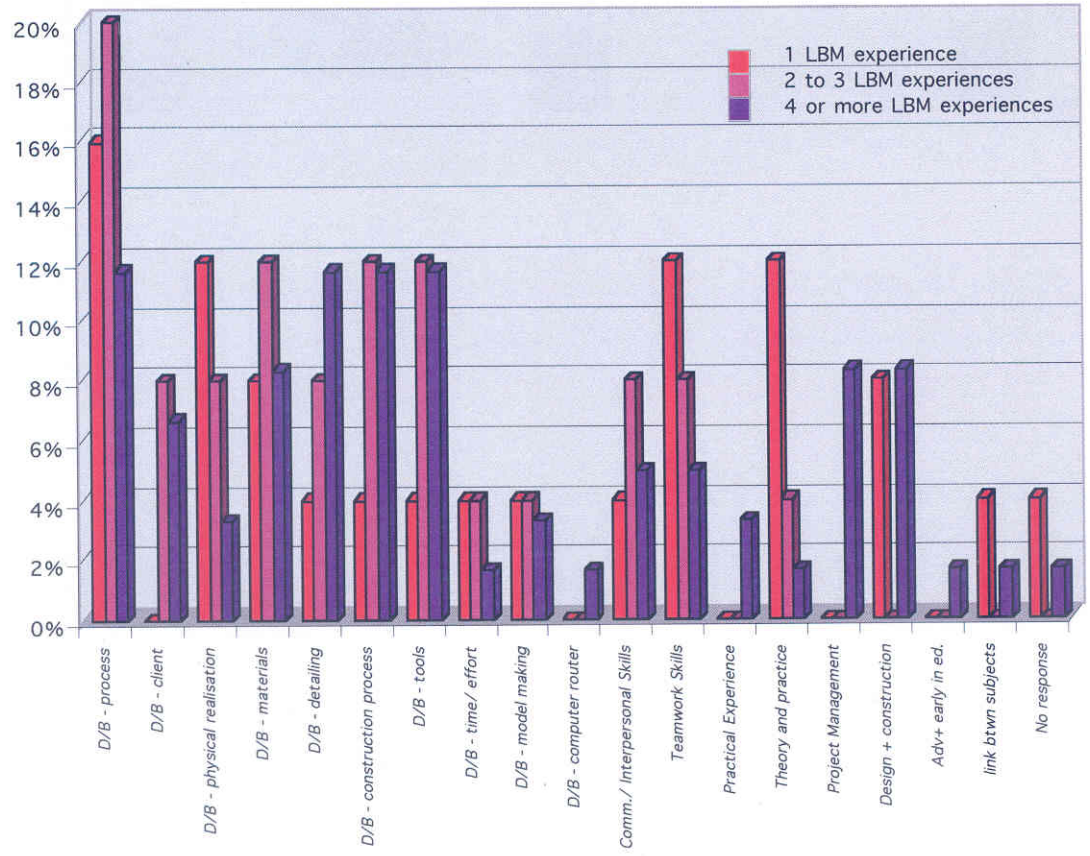


Figure 7.1: The educational value of LBM Studios to final year students.

Examples of responses to Question 2:

> *The important aspect for me, particularly in earlier years was the implication that what is designed, may actually be built. These units also helped inform the BT (Building Technology) units throughout the degree; which, like Design Studio, can sometimes be difficult to draw parallels between designing and building.* (Group 3)

> *Developing an understanding that architecture is inherently influenced by construction, its techniques and possibilities.* (Group 3)

> *Great being given the opportunity to learn practical skills, which at the same time connect with the design process.* (Group 2)

Question 3a:	Have any of your past experiences in Learning-by-Making Studios assisted your understanding of: - the Design process (for example your perception or attitude towards conceiving architecture or level of resolution required in detailing ideas to be realised in built form).

A total of 92% of respondents thought that experiences in LBM had assisted their understanding of the design process. Reasoning varied from the link between design and construction to a better understanding of materials. Participants' responses include:

> *The LBM studies have been valuable in terms of allowing me to appreciate the intrinsic connection between design and construction, and the continued development and reiteration of design right through the construction process.* (Group 3)

> *Understanding how other people approach design is a very valuable process in understanding your own personal design technique.* (Group 3)

> *It becomes something that almost subconsciously effects the way in which you design.* (Group 3)

> *Yes, through modelling, some design opportunities are stumbled upon, often through problems in detailing.* (Group 3)

> *Yes, become more aware (of the) materiality of building elements – their physicality and realisation, that it is far more than lines on paper!* (Group 2)

Overall, three participants did not feel that LBM experiences had assisted their design process. For example:

> *The level of understanding construction/structure in this school of architecture is very limited to only one material – timber... the lack of knowledge of this has also made a lot of students' ideas seem 'floaty'/illogical/ not applicable to real working needs.* (Group 2)

Another student felt that her/his experience had been limited because LBM did not continue into the later years of the course.

Question 3b:	Have any of your past experiences in Learning-by-Making Studios assisted your understanding of: - any other processes, skills or knowledge? (for example, basic understanding of the cost of materials).

In addition to the design process, 86% (28 out of the 30 students) suggested that their LBM experiences informed other areas. Surprisingly, the best responses came from Groups 1 and 2:

> *Group work. The (architectural) ego influences the approach and method of experimentation... The process is more valuable than the outcome.* (Group 2)

> *Greater knowledge of tools and techniques involved in making and what is physically possible.* (Group 2)

> *Innovative use of a limited amount of materials.* (Group 1)

Some students' responses related directly to the example given after the question (*basic understanding of the cost of material).* Despite this, some responses were insightful on this issue.

> *In terms of materials – any decision making process was generally taken out of our hands. So costs and budget were 'enforced' constantly as a limitation, but not informed (by us)...*(Group 3)

Question 4a:	In your above description of processes, skills and knowledge, are any of these applicable to your current work?

During analysis, this question was split into two parts as the question referred to both current and future work. 62% thought that LBM experiences were applicable to their current work. This question had more coding categories than 'yes' and 'no'; in addition, participants' responses could be classified as 'uncertain' with a positive or neutral bias (Table 7.2). The positive bias referred to the respondents' believing that LBM experiences had influenced their current work but they could not provide examples, the neutral bias indicated that LBM experiences had neither assisted nor impeded their current work.

In your above description of processes, skills and knowledge, are any of these applicable to your current work?	
Yes	62%
Uncertain (+)	11%
Uncertain (-)	3%
No	16%
No response	8%

Table 7.2: Responses to Question 4a

The participants who thought that LBM experiences assisted their current work referred to the potential impact of design details increasing their ability to understand construction and to apply teamwork skills. Responses to this question include:

> *Being able to quickly analyse how other people approach design is an essential tool/skill when working in collaboration.* (Group 3)
>
> *Implications for the design process, particularly the design of details.* (Group 1)
>
> *Definitely! I am a bit more confident in construction and that improves my design process.* (Group 1)

The negative responses suggested that some students may have had difficulties in responding to this question as their current work was of a speculative nature, for example:

> *Because my current works are more about paper work and purely design ideas without concerns of construction and technology.* (Group 1)

Even though this quote is from a participant with one LBM experience, the negative responses were distributed across the three groups.

Question 4b:	In your above description of processes, skills and knowledge, are any of these applicable to future work [professional practice] needs?

In analysing participants' responses concerning the application of LBM experiences in their future work, 68% believed it was likely to assist them. The 'no' response (5%) was significantly lower than the Question 4a 'no' response (16%). Participants were far more positive about application of LBM to future works. The *uncertain (positive)* level was 16%.

> *Knowledge of materials and building techniques good for architect/ builder relationships.* (Group 3)
>
> *I think a collaborative approach to work is essential in contemporary professional practice.* (Group 2)
>
> *Definitely ... useful when we come to practise as architects, who deal with real clients.* (Group 1)
>
> *It makes me feel more responsible towards the things that I put down on paper, if I really intend on it getting built.* (Group 1)

An example of an uncertain (positive) response was:

> *I am presuming these skills and knowledge will only assist me in any further involvement in architecture, design and construction.* (Group 3)

Question 5:	If Learning-by-Making has influenced your design process, can these considerations be only applied to small-scale projects or to larger-scaler projects, as well?

This question asked whether the scale of the project, small or large, effects the application of LBM experiences. Most (73%) suggested that experiences from LBM Studio were applicable to both large and small-scale projects (Table 7.3), but qualified this by differentiating between the application for large and small-scale projects.

Small and Large	73%
Small only	8%
Uncertain (+)	14%
No response	5%

Table 7.3: Responses to Question 5

Examples of responses to Question 5:

> *The hands on approach will not be applied to large-scale projects, however the skills learned in smaller projects will provide the ability to conceive and review this general process of making.* (Group 1)

This response was from a mature-age student who had previous experiences in making.

> *I think collaborative design is a 'mode' of working that has similarity of technique across all scales of project.* (Group 3)

> *The broad ideas about communication can obviously be applied to larger projects. The experience of using limited materials – module, sheets etcetera in terms of budget and sustainability are applicable to large projects.* (Group 3)

> *Detailing/finishing knowledge is mainly applicable to small scale projects, but communication and interpersonal skills are applicable to <u>all</u> projects.* (Group 3)

> *Basic principles can carry through to large projects but I don't believe it develops many skills which are required at that scale.* (Group 3)

The last response demonstrates that students' experiences of large-scale buildings are often limited. In most cases, their experience of large-scale buildings would concern sketch design or master plans, whereby an in-depth knowledge of documentation is not required. An uncertain response indicates this supposition, for example:

> *I would say...my understanding of buildability, budgets and construction of large-scale projects, I feel is something I have not had the opportunity to grasp. Any designs of larger scale buildings have not placed a huge emphasis on these kinds of issues. Budgets and buildability is only broached as a problem if you present a copper clad and aluminium building on a remote site.* (Group 3)

Some responses indicated that LBM experiences are only relevant for application to small-scale projects, for a variety of reasons, such as:

> *More relevant to parts than whole. All learning-by-making projects concern small objects. Seems more relevant to single objects, small spaces and detail resolution.* (Group 2)

> *I think it would be only influential on small-scale project partly because these give huge differences of construction techniques between my country and Australia.* (Group 1)

All responses in the small scale, 'uncertain' and 'no' categories (27%) were given by students in Group 1 and 2.

Question 6:	Do you think that the Learning-by-Making projects provided a good insight of why the design process should include/incorporate construction considerations early in the process?

Participants indicated that LBM experiences provided good insight as to why the design process should incorporate construction considerations early in the process (92%). Their responses indicated that they understood the relationship between design and construction. The sophistication of their understanding increased with their experience levels.

> *Yes. Early experience to these processes allow a more sophisticated knowledge, not only of how to put things together, but also of the implications of detailing decisions.* (Group 3)

> *Yes. Gave good knowledge of basic detailing which enhanced understanding of construction in general. Learnt the hard way how annoying it is to have a great design, then have to fit in structural elements!* (Group 3)

> *I believe it made a good basis to move ahead from, it was good to be doing such projects in first year. I think that is where it can be most influential.* (Group 3)

> *'Making' offers possibilities that may be unknown in a drawing...* (Group 2)

> *Yes, the construction strongly affects the aesthetic of the overall product.* (Group 2)

> *Architecture is always about getting something to be built, and this requires good construction and detailing techniques.* (Group 1)

One of the respondents indicated the difficulty of applying this knowledge, but was brief in explanation, offering only the following to this question:

> *Having said that (Yes) I rarely look at materials and details early in the design process!* (Group 1)

This question confused one participant, as he/she thought that it referred to the position of LBM Studio over the five years of study. Consequently, this question would be rewritten for future questionnaires.

> *Not too early, around second year when we got a hint of what architecture really is about – the art of space making.* (Group 3)

7.3 Summary

The **Study 3** questionnaire gave final year architecture students the opportunity to describe and clarify the ways in which they thought their LBM experiences were applicable or beneficial to their work in other units and would be in the future. Important findings for **RQ3** and **RQ4** were as follows:

a) RQ3: What Benefits do Students' Believe Result from Participating in LBM Studios during their Architectural Education?

- 48% of students ranked collaborative Design/build process, translating ideas to built form, as the most valued outcome. The second most valued learning experiences were knowledge of materials, construction processes and tools, (each on 28%). Variations existed between experience levels: students with only one LBM Studio nominated teamwork skills as an important experience, whereas students with four or more LBM Studios accorded these skills much lower priority;
- 92% of respondents thought that experiences in LBM had assisted their understanding of the design process;

- 86% of respondents acknowledged that their LBM experiences assisted their work in units other than *Design Studio*;
- Only 62% thought that the experiences of LBM Studios were applicable to their concurrent work. However, their concurrent *Design Studio* project at the time of the questionnaire was of a speculative nature and was not as concerned with construction resolution. This percentage of 62% increased to 68% when respondents indicated that they thought LBM experiences would assist them in their future work. If the uncertain positive level (16%) is also taken into account, then at least 84% of respondents could see or wanted to believe that LBM experience would benefit them in their future work; and
- 73% of respondents suggested that LBM experiences could be applied to both small and large-scale projects, but qualified this by suggesting that the application would differ for small or large-scale projects; and

b) RQ4: Do Students Link Design and Construction Concepts in LBM Studios?

- Most respondents (92%) indicated that LBM Studios provided a good insight as to why the design process should include construction considerations early in the process (LBM first principle).

The results of **Study 3** indicate that participants of LBM Studios identified skills and knowledge that are beneficial to their development. However, this does not always extend to conscious application. At least 30% of students had difficulty in recognising that skills and knowledge acquired in LBM Studios could be applied to their concurrent work and their future work. The same difficulties (limited or no experience) became apparent when participants were asked if the application of these experiences depended upon the scale of the building.

Chapter 8: Discussion

8.1 Introduction

In this chapter, the results from **Studies 1A, 1B, 2** and **3** are discussed in relation to the four research questions:

- **RQ1:** What is the Students' Levels of Cognitive Engagement in LBM Studio?
- **RQ2:** Do Students have Consistent Learning Experiences in LBM Studios?
- **RQ3:** What Benefits do Students Believe Result from Participating in LBM Studios during their Architectural Education?
- **RQ4:** Do Students Link Design and Construction Concepts in LBM Studios?

Conclusions are then presented in Chapter 9.

8.2 RQ1: What is the Students' Levels of Cognitive Engagement in LBM Studios?

RQ1 and **2** were developed in 2000 in response to concerns expressed by the then Head of School, Dr Andras Kelly at SA UTas. He wanted to ensure that students' learning experiences in LBM Studios were equitable in terms of their engagement in higher-level problem solving and cognitive activities rather than simply spending their time constructing (repetitive motor tasks) a small project for a community group at minimal cost. Before this study was undertaken, it was not known whether these concerns were valid or, indeed relevant in terms of the teaching of design/architecture.

8.2.1 RQ1 - Findings

The data from both **Studies 1A** and **1B** indicate that a 'typical' student in a LBM Studio would spend an equivalent or higher percentage of their time on design activities (high-level problem solving and cognitive activities) than on construction activities (mostly, repetitive motor tasks). Thus, a 'typical' student spent at least 50% of her/his time engaged in high-level cognitive activities.

This percentage was even higher in **Study 1B** as more studio time was dedicated to design and feedback. Students in **Study 1B** were expected to spend more of their own time outside the LBM Studio constructing their final piece of flat-pack furniture. It is important to note (from informal observations of **Studies 1A** and **1B**), that a larger percentage of time spent on high-level cognitive activities (design) did not correlate with a successful execution of design to object. The final submission of furniture pieces did not strongly represent the ideas first conceived by students. This suggests that students require assistance during the construction phase to ensure that design improvements occur.

In **Study 3,** many students acknowledged that the entire experience of designing and building was valuable as it made them give greater consideration to: detailing decisions and made them appreciate that 'great designs' cannot be achieved without considering construction and that *'making' offers possibilities that may be unknown in drawing* (Group 2, Chapter 8, p 6). Observations from **Study 2** also showed the importance of the construction phase. The Interpersonal Responding Style Graph (Figure 6.2, p. 100) suggests that students learn greatly from the construction phase, as they utilised a number of Interpersonal Responding Styles (evaluating, interpreting, supporting and probing) whereas in the design phase usually one style dominated.

These later findings regarding the importance of the construction phase with facilitator support, suggest that problem solving occurs to resolve discrepancies between construction and design. This is a powerful learning experience as it strengthens the relationship between design and construction. It can therefore be assumed that students' engagement in high-level cognitive activities and problem

solving is experienced during the construction phase. This suggests that the students may spend significantly more than 50% of their time engaged in high-level cognitive activities.

8.3 RQ2: Do Students have Consistent Learning Experiences in LBM Studios?

As indicated earlier in **RQ1**, Dr Kelly's concerns extended to the consistency of student experiences: *did all students gain the same opportunities to develop skills and knowledge from participating in a LBM Studio*? It was anticipated that student experiences would vary because of the teamwork structure. Thus, the critical questions were by how much and in what ways did the teamwork structure affect students' learning experiences?

8.3.1 RQ2 - Findings

As the data generated by this question is complex, this section is divided into four main areas:

a) Variations Between Student Learning Experiences;
b) Working in Groups;
c) Different Learning Priorities due to the Number of LBM Studios undertaken; and
d) Variations in LBM Studio Workshop Hours.

The first main area (a) was further divided to address general and detailed issues separately.

a) Variations Between Student Learning Experiences

- Level of Variation in Students Learning Experiences in Study 1A and 1B

  As expected, student-learning experiences in LBM Studios varied in both **Studies 1A** and **1B**. In **Study 1A**, the variations were most apparent in the categories of 'communication' and 'construction' (8%). In **Study 1B**, the variations were even more pronounced, in the categories of 'construction' (17%), 'drawing' (14%) and

model making (9%). Although 'communication' was one of largest variables in **Study 1A**, a similar percentage was achieved in **Study 1B**. This suggests that the 8% variation represents the range from students who discuss their ideas freely within a group and students who are more reluctant to voice their ideas in a group.

- Level of Variations in the 'Construction' Category

  In **Study 1B** 'Construction' had the largest variation (17%), a consequence of half the student group electing to use the CNC router and the other half constructing by hand. On average, students who constructed by hand spent 10% more of their time in 'construction' than students using the CNC router. The difference in time spent between hand construction and the CNC router was unaffected by the participants' experience levels.

- Level of Variations Between Inexperienced and Experienced Students

  Other patterns that emerged in **Study 1B** resulted from the student make-up of the LBM Studio. The studio class was divided evenly between experienced and inexperienced participants. On average the inexperienced students, drew more, had a higher absentee rate and constructed less. These results are indicative of a lack of experience in 'making', as students were reluctant to depart from the design phase, hence the larger percentage of time spent drawing. Their inexperience with construction may also be related to their higher level of absenteeism from the School Workshop. Supporting these observations, the student with the highest percentage of 'drawing' and one of the lowest percentages of 'construction' expressed a desire "to gain confidence with machinery" before commencing the LBM Studio. This may be an instance of where the support of lecturers during the construction phase would have benefited the student.

Evidence suggests that it is important for students to experience success in both the design and build phases, as this is how students become more confident and skilful designers. This may explain why it was difficult to get students to respond to the final questionnaire in **Study 1B**; many students commented informally that they were disappointed with their final pieces of furniture.

- Relationship Between 'Drawing' and 'Construction' Categories

  An inverse relationship appeared to exist between 'drawing' and 'construction' categories (**Study 1B**). An inexperienced student with the highest percentage in 'drawing' had one of lowest percentages in 'construction', while an experienced student with the highest percentage in 'construction' had the lowest in 'drawing'. These results illustrate the variations that can exist within a LBM Studio. This finding does not apply to all inexperienced or experienced students but represents the variation between students' learning experiences in a LBM Studio.

b) Working in Groups

In **Study 1A**, students formed their own groups, ranging from two to four members. It appears once the group size reached four in this LBM Studio, it was possible for one group member to be less involved. However, it is unclear from this study whether this occurrence was an anomaly, due to the individual student.

Interviews from **Study 2** confirmed that other factors, such as students' interpersonal skills and how they work within a group, affected their learning experiences. Student 1 indicated in detail that her/his involvement in group discussions and design decisions was less than usual, because group members were unfamiliar to her/him. Student 1 believed that this situation did not affect the quality of her/his input but the extent of it. The other members of Student 1's group (Student 2 and 3) were more confident and willing to express their ideas.

It was also apparent from Student 1's interview that her/his role in documenting the bus shelter (in CAD) differed from the roles of the rest of the group as only one student was required for this task. Student 1 hesitated in accepting this role, she/he was already experienced in this area, but undertook this role as no one else could perform this task quickly. This action suggests that Student 1's first concern in the LBM Studio was to be a 'team player' before considering her/his own learning needs.

Student 2 described how the group (comprising Students 1, 2 and 3) fractured in the construction phase due to the individual dominant leadership styles. This occurred as

other groups appeared to require assistance and motivation, an initiative that received mixed responses from the other groups.

Lecturer 1 noted that Student 2 initially found the collaborative design process confronting and difficult due to the group structure, as no person had control and a common design strategy for groups to follow was not established. According to Lecturer 1, Student 2's approach and attitude became more flexible during the construction phase, as it was apparent there were opportunities to resolve design details during the making process. Student 2 took pride in resolving a particular design detail. This illustrates that even though students were working within groups, it is important that they sense that their own contribution is meaningful; otherwise, motivation may be lost.

The transcripts from **Study 2** provided further examples of the collaborative design process significantly affecting students' involvement in a number of learning experiences, due to their interpersonal skills and their 'natural' role within a group. Despite these issues, both Student 1 and 2 reflected positively on the collaborative process. Many of their memorable experiences were linked to teamwork during the construction phase.

Lecturer 1 indicated from her/his experiences in LBM Studios that many students, (particularly those who have studied architecture for a few years, for example Student 1 and 2) initially find the collaborative design and build process a 'painful' experience. It has been a common observation by Lecturer 1 that participants 'exhaust' themselves by trying to reconcile a different design approach. By the construction phase, individual students become 'less precious' about the design and appreciate that the design evolves throughout the entire studio. The completion deadline also forces all the groups to trust each other and contribute equally to a small building project.

c) Different Learning Priorities Due to the Number of LBM Studios Undertaken

In **Study 3**, respondents indicated that the collaborative design and build process was the most valuable experience gained through LBM Studios (at 48%, this percentage encompasses students' who have participated between one to seven LBM Studios)

Study 3 indicates that the number of LBM Studios undertaken previously is a significant issue as the desired learning experiences change. Participants with only one LBM experience consider teamwork skills important whereas for participants with at least four LBM experiences, teamwork was less of a priority. The latter wanted to develop their knowledge in construction and tools. However, their subsequent responses indicated that they could recognise the value of the teamwork skills learnt and their ability to apply them in other situations.

d) Variations in LBM Studio Workshop Hours

Not only did students' experiences vary within a LBM Studio, but also in the type of and time commitment to LBM Studios. In particular, findings from **Study 1A** demonstrated that students and lecturers shared an immense willingness to work beyond 'normal' studio hours to complete a community project on a significant site. In **Study 1B**, students were observed to be less motivated at the end of the LBM Studio. There are a number of reasons. First, it was not critical to finish the furniture piece as it was designed and made by them. Second, they deemed the demands of other units such as *Design Studio* and *Building Technology* to be more important. Third, the lecturers were not significantly involved in the construction process, resulting in reduced student application.

8.4 RQ3: What Benefits do Students' Believe Result from Participating in LBM Studios during their Architectural Education?

This question was developed to provide insight into students' perception of LBM Studios and LBM's benefits to their studies in architectural education. **RQ1** and **2** established from observations the student learning experiences that occurred whereas **RQ3** and **4** addresses the question of what students gained from their experiences in LBM Studios.

8.4.1 RQ3 – Findings

In **Study 1A**, only 50% of participants thought that LBM experience would benefit their future work in *Design Studio* and *Building Technology* units. However, the findings of **Study 2** contrasted those of **Study 1**. There was an overwhelming belief among the students that LBM positively benefited their future work in Design Studio and units related to construction knowledge. **Study 1A** could not be discounted, as these participants were more experienced at LBM Studios (between 3 to 4 undertaken previously). These disparities were further investigated in **Study 2** using the interview method.

Initially, the students interviewed had difficulty in establishing a beneficial link. The scale of the projects, building complexity, and material selection seemed to hinder the linkage process. Later in the interviews, however, both students concluded there were potential applications. They made this conclusion when recalling experiences from their LBM Studio.

Study 3 was undertaken to interrogate this apparent anomaly and other questions. In **Study 3**, final year architecture students responded to a questionnaire, reflecting on their LBM experiences and its value to their architectural education. This group of students (37), varied in the number of LBM experiences that they had encountered over their five years of study. In total, some students had been involved in 7 LBM Studios, while others had gain one experience.

One question directly explored the issue of scale and whether this limited the application of LBM knowledge. It was not considered problematic by 73% of respondents, but these students did comment that some aspects were more relevant to small-scale projects and others more to large-scale projects. For example:

> *Detailing/finishing knowledge is mainly applicable to small-scale projects, but communication and interpersonal skills are applicable to all projects (Group 3).*

Some respondents indicated that their thoughts concerning the application of LBM knowledge to large-scale projects were limited, as they had no experiences from which to draw.

Study 3 also illuminated other aspects of students' application of LBM knowledge. The data supported **Study 2** findings that LBM experiences had assisted their understanding of the design process (92%) and work in other units (86%). However, their recognition of LBM's benefits was not always supported by their answers to other similar questions. Only 62% thought that LBM experiences had assisted their concurrent work. This can be explained by the fact that the students' concurrent project was of a speculative nature and did not involve much technical resolution. The percentage increased slightly when the question focused on whether LBM experiences would assist future work (68%). This was still surprisingly low; perhaps their uncertainty or inexperience partly explains the low response.

8.5 RQ4: Do Students Link Design and Construction Concepts in LBM Studios?

RQ4 represents one of the two underlying aims (Section 3.3 The Origin and Development of LBM) that give rise to the current LBM Studios at SA UTas. Specifically, it is to give students, at an early stage of their architectural studies, 'first hand' experiences of designing and building a project so that their understanding of the design process involves the critical consideration of materials and construction at the same time as considering form, function and aesthetic qualities. Inherently, most architecture students are aware that there is a significant connection between design and construction. However, their understanding is at a basic level. Few students recognise that design and construction considerations may occur concurrently, thus continually informing the unfolding design process unless they are specifically taught to do so. Lecturers involved in LBM Studios believe that without 'first hand' experiences (such as LBM Studios) to link the relationship between design and construction, students will not gain this understanding until they enter architectural practice. **Studies 2** and **3** further investigated whether students' understanding of this relationship develops from participating in LBM Studios.

8.5.1 RQ4 - Findings

In **Study 2**, the students' conversation content indicated that design (*form/qualities category*) and construction issues (*buildability category*) were discussed on the first day of a LBM Studio and continued to dominate the conversations during the design phase. During the construction phase design conversations occurs less often. The observation findings of **Study 2** indicated that the LBM model ensured students considered and incorporated design and construction concepts during the early part of the design process.

The follow-up interviews with Students 1 and 2 indicated that both gained a better appreciation of the connection between design and construction as a result of participating in LBM, although they had difficulty applying this to their concurrent design projects (both at the School and in an architectural office). These students had no prior experiences of LBM Studios but had part-time employment in architectural offices. These issues of recognising and applying knowledge from the LBM Studios are discussed in Section 8.4.1.

In **Study 3**, early findings regarding students' ability to connect design and construction concepts were confirmed. In the questionnaire, 92% of these students thought that LBM Studios had given them insight as to why the design process should incorporate construction considerations (early in the process). Students further reinforced these notions by describing this experience in response to other questions, for example:

> *The LBM studies have been valuable in terms of allowing me to appreciate the intrinsic connection between design and construction, and the continued development and reiteration of design right through the construction process (Group 3).*
>
> *It makes me feel more responsible towards the things that I put down on paper, if I really intend on it getting built (Group 1).*

Chapter 9 presents the conclusions drawn from these findings, then discusses the contributions and limitations of this thesis, and finally further research opportunities.

Chapter 9: Conclusions

9.1 Introduction

The Learning-by-Making (LBM) Studios at the School of Architecture, University of Tasmania (SA UTas) have become a popular and rewarding experience for students. Support has grown in the community and industry with both entering into partnerships with the school. The LBM Studios have also provided a distinguishing edge to market SA UTas to potential students in and outside Tasmania. Until this study was undertaken, limited research had occurred. This is also the case in the United States, the country in which Design-build (D/B) Studios are most prevalent.

In principle, the concept of students learning from Design-build experiences is widely accepted. Lecturers involved in LBM and D/B Studios are enthusiastic and their anecdotal experiences have been documented. Finished projects have also received strong support from international journals and other media. However, scholarly research confirming the perceived benefits of D/B Studios has not been undertaken. Therefore, the aim of this thesis was to investigate the educational benefits gained by students who participate in LBM Studios. Specific research questions were developed (**RQ1, 2, 3** and **4**). These helped to establish students' individual learning experiences (using observations) and collect feedback from students (using questionnaires and interviews) and the benefits of LBM Studios.

Before presenting the recommendations and conclusions of this thesis, this chapter first provides a review of the thesis structure, limitations of the research, study contributions and potential for further research.

9.2 Review of Thesis

Chapter 1 discussed the concerns that gave rise to this study in LBM Studios at SA UTas and its background. **Chapter 2** outlined the context in which LBM Studios, by

examining the contentious relationship of building experience within architectural training and later, as a part of higher education. This chapter then focused on the McNeil era of architectural education in Tasmania (1970-1979) in which student centred projects and 'learning-by-doing' lead to the first LBM Studios, they provided inspiration and confidence for those that followed in the 1990s and beyond. Finally, **Chapter 2** investigated current concerns and issues associated with architectural education and the most pertinent recommendations for LBM Studios.

In **Chapter 3** the origin and development of the LBM Studios at SA UTas were examined and compared with D/B Studios (in most cases located in the United States), establishing that only limited research in this field of architectural education had occurred. It was identified that the LBM model is closely associated with ideas of Experiential Learning (EL). At the end of literature review chapters, specific research questions were put forward. The scope of the research had been confined to current studies of LBM Studios at SA UTas, in the area of student learning experiences and their reflection on these, in terms of their overall architectural education.

Chapter 4 described the research design process and the methods used to investigate LBM Studios. The preliminary findings of each study informed and influenced the development of the subsequent study. Therefore, **Studies 1A** and **1B**, **2** and **3** were detailed in **Chapter 5, 6** and **7** respectively. **Chapter 8** drew together the preliminary findings in according to the specific research aims.

9.3 Limitations of Research

There were four main limitations on this research:

a) The literature review did not reveal research precedents, which might provide appropriate methodologies for this study. Most of the literature gave an overview of the LBM or D/B process for a particular project and the lecturers' motivation to initiate these types of studios within architectural education. Approaches were made to experienced D/B facilitators in the United States, seeking additional

information or local research, but no significant materials resulted. These limitations highlighted the importance of this research, particularly as external writers have identified its merit. As architectural education did not provide an appropriate model, a methodology was located in the field of education to evaluate LBM.

b) Difficulty was experienced at the beginning of the data collection phase, in designing questions that assisted students in the process of reflecting upon and recognising their learning experiences from LBM Studios. Questions had to be written in such a way that students would not be confused or 'put off', as it was uncommon for them to formally reflect on their learning experiences. Generally, their only formal experiences of reflecting on architectural education are connected to SETLs (Student Evaluation of Teaching and Learning at the UTas). SETLs enquire about the general teaching performance and whether content was presented appropriately. Unless specific questions are structured for inclusion in the SETLs, no relevant information is provided by this activity.

c) Some participants in **Study 3** had difficulty recognising the application of LBM skills and knowledge. It was unclear whether these results were accurate, (as some students indicated) by the fact that most of the skills and knowledge had become a sub-conscious part of their design process, and added to by other experiences during the five years of study.

d) The Illuminative Model was advantageous to this research as it allowed the scope to be refined over the course of the research, as more was learnt from initial investigations. However the time required for data collection may extend beyond the time frame of master's research.

9.4 Recommendations

9.4.1 RQ1: What is the Students' Levels of Cognitive Engagement in LBM Studios?

Typically, students participating in LBM Studios spend an equivalent or higher percentage of their time engaged in design activities, including: discussing and reviewing design and construction concepts with peers, lecturers, clients, and consultants; site analysis; problem-solving; decision-making; and model making (associating design and structure issues together). These are considered high-level cognitive activities or meta-cognitive activities.

This research also revealed that construction activities did not only include low-level cognitive activities and repetitive motor tasks but also high order cognitive activities, such as resolving the detailing of materials whilst assembling the project. The construction phase was crucial as it provided the most powerful learning experiences as students observed first-hand the implications of their design thinking and decisions. The construction phase may also be considered as a 'testing' phase because the activity of building their design provides impartial and valuable feedback to students with little input from the facilitators. It could be considered a 'testing' phase. The entire construction phase requires the support of the facilitators (LBM lecturers, workshop manager and tutors), otherwise students are unlikely to modify their design due to construction issues, thus limiting their learning opportunities. However, to ensure that the construction phase allows students to make valuable links between design and construction, students also need to be willing to learn. Both the lecturers and students share equal responsibility in terms of students gaining a variety of learning experiences during construction. This minimises the potential of some students spending most of their construction phase, sanding and painting.

Recommendations:

- Participants in LBM Studios should be involved in the entire process of designing and building to gain full benefit from the experience, especially if the connection between design and construction is to be strengthened;

- Facilitator support is essential for the entire construction phase;
- All construction should take place during LBM Studio hours; and
- Projects and materials selected should not require a high level of finishing otherwise students might spend a large proportion of their construction time, sanding and painting.

9.4.2 RQ2: Do Students have Consistent Learning Experiences in LBM Studios?

Student learning experiences varied in LBM Studios due to the teamwork structure, the willingness of the individual to experiment with new ideas and to learn how to operate tools and machinery, and the number of LBM Studio in which they had previously been involved.

In the research, students' experiences varied in their contribution to discussions, participation in construction activities and the amount of time spent on design work (model-making or drawing). Interviews confirmed that the interpersonal skills of students and how they work within groups affected their learning opportunities, both positively and negatively. It is unclear if this is a significant problem therefore further research in this area has been suggested. Even though the collaborative Design-build process of the LBM Studios challenges students (particularly those with no prior experience), the majority reflected positively on their experiences.

As noted, other areas identified in the LBM model that require further investigation were:

- the difference between students' experiences in LBM studios, depending on the number of studios they have previously been involved. Early findings suggest that inexperienced students drew more, had higher absentee rate and constructed less. Experienced students also had different learning priorities to inexperienced students as they wanted to develop their knowledge of materials, tools and the construction process rather than teamwork skills.

- the relationship between drawing and construction. Is there a recommended percentage of time to be spent in either activity or is it more important that both activities occur as it integral to LBM process.
- the effect of using the CNC router as opposed to hand building (**Study 1B** observed these distinctions in the last two dot points.) Computer workstations have been introduced into Timber Workshop, allowing students to generate CAD files adjacent to the CNC router facilities, has this worked successfully?

Recommendations:

- Facilitators in LBM Studios should have highly developed interpersonal skills to monitor, manage, and encourage useful student interaction with peers to ensure that all students gain a variety of learning experiences from their participation;
- Facilitators should be aware that students' personal learning objectives are influenced by the number of LBM Studios in which they have participated;
- Students with previous experiences in LBM Studios should establish a set of personal learning objectives at the beginning of the LBM Studio in consultation with LBM lecturer, assessment criteria should be adapted or amended accordingly.

9.4.3 RQ3: What Benefits do Students Believe Result from Participating in LBM Studios during their Architectural Education?

This thesis shows that generally, students believed that LBM Studios were beneficial to their architectural education. The final year students were able to elaborate in more detail the ways in which the Design-build process was valuable. It impressed on to them, at an early stage of their study, that it is important to consider construction during design and to be more aware of what they are drawing as drawings are instructions for others. This confirmed observations by Clayton *et al* that students give more consideration to the ways in which construction affects design and design decisions after their participation in a LBM Studio. It also confirms that the first principle of LBM, the belief that students need some appreciation of the processes involved in making projects, to understand the

concurrent relationship between the act of designing and incorporating construction knowledge is achieved by students' participation in LBM Studios. In addition, students noted that other knowledge and skills were acquired such as collaborative design, teamwork, using the qualities of the building material or construction process as inspiration for design, incorporating budget constraints into the design process, liaising with authorities and consultants, learning to understand the clients' needs and many more were acquired.

Students believed that LBM experiences contributed to their architectural education. Some could list the benefits, but others had more difficulty in recognising these when the question was phrased in terms of assisting their other work. Several responses indicated that the difficulties might have arisen from the disparities between the LBM project and their other work such as scale, the type of materials used (or not used) or their inexperience (for example on large-scale projects or future practice work) and thus inability to draw from experience.

Recommendations:

- Facilitators should discuss with students both formally and informally the possible connections that students can make between LBM experiences and their other student work and future work in practice. They should also cultivate a culture that encourages students to look for links between units, knowledge and skills.
- The LBM model should incorporate formal devices to encourage students to reflect on and record their learning experiences and the potential benefit this may have in terms of their other work or, more generally, in developing their understanding of architecture.

9.4.4 RQ4: Do Students Link Design and Construction Concepts in LBM Studios?

This thesis shows that the students believed that their design understanding and process had benefited from their LBM Studio experiences. It appeared that their awareness and knowledge of architecture had gone beyond the abstract nature of

drawing (by hand or computer) to include the implications of materials, construction and building assembly. Students suggested that LBM Studios do not answer all their questions but in many cases helped them to understand that their design process should include constructional considerations, which may require additional research. Observations also confirmed that the LBM Studios ensure that students consider design and construction through the model-making process, mocking-up construction details at a scale of 1:1 and finally through the process of refining the design during the construction phase.

Recommendation:

- The SA UTas should ensure that one LBM Studio (either community based or small four-day Studio) be incorporated into the curriculum at an early stage of every student's architectural studies, to enhance student understanding of the relationship between design and construction.

9.5 Contributions to Knowledge and Further Research

This thesis has contributed to the development of methodological knowledge in terms of evaluating architectural education without the requirement for expert panellists by employing the Illuminative Model. As discussed in **Chapter 4**, the Illuminative Model was most appropriate as the method was similar to the design process used in architectural practice. In **Study 2**, analysis of conversation content and interpersonal responding style of students showed that students' approaches and attitudes differed according to the activity and their familiarity with it.

This thesis has also great value as it documents the development of LBM Studios in architectural education generally and at the SA UTas specifically. In addition, the database of 57 LBM or D/B Studios throughout the world is the most comprehensive compiled to date, providing further opportunities for discourse. The table comparing the main characteristics and important learning experiences of LBM and D/B Studios is thought to be the first attempt at this type of analysis. Previous publications and papers describe only the D/B Studios examined in individual case studies. As so little

has been done to date there are many opportunities for future research into aspects of LBM and D/B Studios and specifically LBM Studios at SA UTas.

In the field of LBM and D/B Studios, the four most important issues have been posed as research questions below:

- Do architects and graduate architects who participated in LBM and/or D/B Studios (during their architectural education), believe that LBM and/or D/B experiences assisted them entering or working in practice? (As outlined in Chapter 2, it has been suggested in the United States that D/B Studios assist students' knowledge of construction and practice, often thought to be deficient);
- Do students participating in one stage of the D/B process, gain sufficient educational experience and benefit when compared to students involved in the entire D/B process? Some D/B Studios undertake large and complicated projects such as residences allowing students to contribute to only a part of the D/B process;
- Do students gain sufficient or new knowledge and skills from participating in more than one LBM or D/B Studio? According to the findings of this study, students' learning priorities switched from collaborative approaches to more detailed knowledge in construction when they undertook several LBM Studios. It was also identified that students with no previous LBM experience gain a new appreciation for scale, by drawing or model making at a scale of 1:1.
- What are the advantages and disadvantages of using group work structure in LBM or D/B Studios? Many were identified in this thesis, but more detail is required to evaluate this question.

Specifically, in terms of LBM Studios at SA UTas, the following tasks offer further consideration:

- Examine the impact of the CNC router; does it limit students' learning experiences by removing them from the processes of construction or is the process less rigorous than the process of resolving detail when constructing by hand. LBM Studios are important because LBM connects students' abstract knowledge to the actual processes and materials that form

architecture. It is believed that without these experiences, students are initially limited in their understanding of design and architecture. Do drawing instructions for the CNC router using CAD assume prior understanding of materials and the processes of construction, or is it through this experience that students' may learn also?

- Refine and re-work LBM Studio objectives and assessment procedures by examining EL strategies as well as problem based learning; and
- Investigate in more detail the issues related to recognition and transfer of LBM knowledge to students' other work and pilot new teaching strategies to assist students in this process.

9.6 Conclusion

This research has established that SA UTas students gain a beneficial level of cognitive activities, knowledge and skill through LBM Studios, improving their:

a) understanding of the design process;

b) awareness of the implications incurred by building their designs; and

c) capacity to develop new strategies and skills in teamwork and communication.

This research has also dispelled the negative connotations associated with Learning-by-Making - that a primary objective is to teach students building skills and consequently students spend much of their time on low-level activities.

Personal involvement in LBM Studios over the course of this research (four years) in a variety of roles such as, researcher, tutor, lecturer and coordinator has allowed different perspectives to be observed and ideas to be tested. The process of students' reflecting daily on their LBM experiences and the development of short LBM projects has resulted in conjunction with this research work, reinforcing the validity of the findings. Furthermore, discussions regarding early findings from this research have influenced both Clayton and Green to examine and improve LBM teaching practices. This has even extended to them partaking in their own LBM process (Plywood Beach Shacks) to familiarise themselves with the experience and expectations required by the model.

In turn, the conclusions of this thesis indicate that LBM Studios provide a vehicle for delivering the principle recommendations, *Diversity, Teamwork* and the *Relationship between Education and Practice* resulting from review of key documents in United Kingdom, United States and Australia.

Drawing from these conclusions, LBM Studios at SA UTas have improved students' understanding and learning within architectural education, indicating the relevance of its inclusion in the 21st century.

Learning-by-Making

Design-build Studios at the School of Architecture at the University of Tasmania

Book 2/2

Louise Wallis

A thesis submitted in total fulfilment of the requirements of the degree of Master of Design

May 2005

School of Architecture
University of Tasmania
Australia

Statement of Original Authorship

The author, Louise Helen Wallis, hereby declares that the material included in this thesis comprises only her original work, except where clear acknowledgment is given in the text to another author.

Signed:

Louise Helen Wallis

Statement of Authority of Access

The author, Louise Helen Wallis, hereby declares that this thesis may be made available for loan and limited copying in accordance with *Copyright Act 1968.*

Signed:

Louise Helen Wallis

Appendices

Appendix 2.1: Detailed Summary of the Development of Architectural Education, in terms of Workshop-based Experiences

During the 17th and 18th centuries, architects emerged from many backgrounds. To be an architect did not require any formal training (Crinson and Lubbock 1994, p. 7). The status and title of the architect was already in a precarious position, as the terms 'architect', 'surveyor' and 'engineer' "were virtually synonymous" (Wilton-Ely 1977, p. 192).

According to Kaye (1960) those considered architects "were 'gentlemen architects', who had no special training" bar their "own reading and travels". Generally, the 'master-artificers' resolved the design and detailing (Blomfield 1897 in Kaye, 1960, p. 40). Wilton-Ely explains there were "three basic categories of designer, often operating by side, in the form of the gentlemen-architect, the artist-architect and the craftsman-architects" (Wilton-Ely 1977, p. 187). Crinson and Lubbock choose not to distinguish these differences and described the architect more generally. People working within the building or arts industries "... emerged briefly as the apparent designer of a building and then..." changed roles or departed (Crinson and Lubbock 1994, p. 7).

Training for an architect formalised with the, "transition from medieval to modern processes of thought and the shift from an agrarian to a capital-based society through the Industrial Revolution" (Wilton-Ely 1977, p. 180). By the 18th century, the 'pupillage system' had become the common method to train architects (Crinson and Lubbock 1994, p. 22). Under this system, an aspiring student would pay a one-off premium to a practising architect before commencing pupillage in their office. Alternatively, their labour was exchanged for training. Ideally, this type of training would entail learning draughtsmanship and office practices for five to six years (Crinson and Lubbock 1994, p. 24).

Pupils were bound to their masters and often, lived in their houses (Briggs 1927, p. 352). Welby Pugin has described the regimented lifestyle that his father's pupils endured:

> *...indeed, from the moment the mistress of the house awoke no one was ever permitted to get any rest...A pitiable sight indeed it was to see the shivering youths reluctantly creeping down in the midst of winter to waste their time by a sleepy attempt to work before breakfast. The pupils would even continue to work after the evening meal till eight o'clock. The only leisure afforded them was from that hour till ten, when they retired to rest" before the next day began at four o'clock in the morning* (Ferrey 1861, pp. 27-8 in Briggs 1927, pp. 352-353).

Experiences did vary. Sir William Tite recalls his good fortune to escape the usual custom of being sent to the carpenter's shop for three years (Fletcher 1934, p. 85); instead he worked in an architect's office.

Pupillage was later enriched by the advent of the Royal Academy, which was formed in 1768 to provide evening classes devoted to fine art (Crinson and Lubbock 1994, p9). Students would also commonly supplement their training by sketching and measuring old buildings on Saturday afternoons (Briggs, 1927 #162, pp. 354-5). Once their pupillage was completed it was expected that the pupil would travel and gain experiences abroad particularly in France, Italy and Greece (Crinson and Lubbock 1994, p. 24). All these methods were based on experiential learning.

Pupillage was criticised, as pupils were generally deficient in their knowledge of business, materials and use, and construction. A member of George Dance's office recognised these problems but asserted that it was unhelpful for the development of an architect to participate in the practical work of the trades (An Essay on the Qualifications and duties of an Architect, 1773, in Kaye 1960, pp. 49-50)

Pupillage is also described in other texts as 'apprenticeship' and 'articled'. Crinson and Lubbock suggest the term 'pupillage' signified the decline in the medievally conceived apprenticeships boosting, its appeal to the middle classes. This appeal was firmly established when training focused on architecture and a "division of labour

between the architect and other builders" was identified (Crinson and Lubbock 1994, p. 22). Despite these advancements, architects could still emerge from a variety of backgrounds. The profession needed to be realised before both education and qualifications would be formally recognised.

At the end of the 18th century, there were several attempts to create distinctions between surveyors, engineers and architects by the formation of professional societies (Wilton-Ely 1977, p.192). This process was accelerated by the Industrial Revolution, during which the scale, management and process of building had rapidly expanded and become more complicated. (Lubbock and Crinson, 1993, p. 47). Large construction companies now competitively tendered for lump sum contracts. The tripartite relationship between client, designer and craftsman had been dislodged by the advent of the general contractor (Wilton-Ely 1977, p. 193). As a result, to survive professionally, surveyors, engineers and architects were forced to define their roles within the new design and construction process. Architects enthusiastically developed their services to provide detailed specifications and drawings (Crinson and Lubbock 1994, p. 44). It was thought that this would improve their status and further distance them from their trade origins.

Eventually architectural groups were brought together by the foundation of the Institute of British Architects, later known as the Royal Institute of British Architects (RIBA) in 1834 (Gotch 1934, p. 7). While the RIBA could have orchestrated the direction of architectural education, it initially showed no interest in doing so. Similarly, most universities did not wish to offer courses in complete professional training (Powers 1993, p. 33). Only King's and University Colleges and the new Government Schools of Design provided a foundation course before pupillage in the 1830s (Crinson and Lubbock 1994, p. 49).

As the professional body was indifferent to educational reform it was left to students and junior architects to encourage the first major developments. Interestingly, it was the junior architects who formed the Architectural Association in 1847 and implemented the first design class (Wilton-Ely 1977, p. 198) (Crinson and Lubbock 1994, p. 65). It was their campaign to introduce an equivalent to the French *Diplome d'architecte* that persuaded the RIBA to hold voluntary examinations for admission in 1863 (Wilton-Ely 1977, p. 199).

This decision was controversially received and the uptake for voluntary examinations was low (Crinson and Lubbock 1994, p. 57). Ruskin's reaction was considered the most extreme as he called for the union of architecture and sculpture and the removal of the link with engineering (Ruskin 1864-65 in Crinson, 1994, p. 57).

In 1882, membership to the RIBA was determined by compulsory examinations (Fletcher 1934, p. 88). Technical competencies and measurable skills were tested (Crinson and Lubbock 1994, p. 59). The Schools and Academies, which included the Architectural Association, the Government Schools of design and the Royal Academy, immediately realigned their curriculum to ensure their students passed these examinations. This created a strong division within the architectural profession as art and design had been reduced in importance or removed entirely from the curriculum (Crinson and Lubbock 1994, p. 62). Consequently, in the 1890s, breakaway groups were formed: the 'art' camp developed alternatives to ensure that the education of architects was more broadly based than the technical competencies tested by the examinations (Crinson and Lubbock 1994, p. 65). The 'profession' camp continued to campaign for registration and support for the professional examinations to be maintained.

Although the pupillage model maintained its dominance, the 1890s represents a period when the ideals of the Arts and Crafts Movement flourished as a supplementary course as it:

> *...attempted to recuperate the practices and skills that had been dissipated or destroyed by the Industrial Revolution and to locate the architect in the camp of the sculptor and the painter, rather than in that of the engineer and contractor* (Crinson and Lubbock 1994, p. 65).

This statement parallels statements made in 1865 by John Ruskin, who states his opposition to the RIBA's desire to create a specialist profession (Wilton-Ely 1977, p. 200). It was not until the 1890s that these beliefs were interpreted and put into practice in "several architecture schools, notably at Liverpool, the Architectural Association, Birmingham and the new schools set up by the London County Council" (Crinson and Lubbock 1994, pp. 65-66). William Lethaby's contribution was most significant; his involvement with the London County Council led to the

development of a program and this work subsequently influenced the other schools (Crinson and Lubbock 1994, pp. 66-72).

There were many strong and underlying principles that formed the Arts and Crafts educational model as developed by Lethaby, and many were borrowed from Ruskin and his associates (of whom Lethaby was an ardent supporter). Lethaby shared the belief that a noble piece of art could only be achieved through the "action of making and these actions must conform to universal principles" (van der Plaat 1999, p. 365). Artistic expression was gained "through direct contact with materials" and the source of ornamentation was derived from nature; most importantly by "reuniting the hand and the heart in the act of design" the damage caused by "the division of labour" would be repaired. It would return the delight of design and "the financial middleman, the contractor" could then be replaced by "architects who worked on the building site and the craftsmen who had an opportunity to think as well as make" (Swentarton 1989, pp. 104-105, 117).

In contrast to Ruskin and Morris, Lethaby married these romantic ideals with immediate demands for efficiency and rationalism. Lethaby's ultimate goal of was to re-unite production with art (Swentarton 1989, pp. 96-97). Lethaby also departed from Ruskin's theories in his acknowledgment of the 'object world', recognising that both the 'doing' and the 'knowing' were of equal importance in the conception of design (van der Plaat 1999, p. 365).

Lethaby did not rigidly perceive that architectural training was distinct because the domain of architecture encompassed many of the crafts. This was evident in the curriculum as there were two core subjects of building and architecture in which many craft subjects were offered (Crinson and Lubbock 1994, p. 68). There was also emphasis placed on workshop training. Students were taught that design occurs at the point of production and they were partially trained with craftsmen to gain an appreciation of materials' capabilities and limitations (Swentarton 1989, p. 113).

The Arts and Crafts model reinstated the importance of the doing and knowing as a holistic process to create architecture and craft, but its appeal was short lived. In part, the Arts and Crafts alternative lost favour, as the battle to create a specialist profession was achieved by the RIBA. Interestingly, Wilton-Ely work does not refer

to the development of the Arts and Craft during 1890s. Instead the form of architectural education developed by the Architectural Association (AA) gained quick favour and led to full-time courses. Discrepancies exist between Wilton-Ely and Crinson and Lubbock on the reporting of craft inclusion at the AA (Wilton-Ely 1977, p. 204) (Crinson and Lubbock 1994, p. 71).

The first full-time course commenced in 1895 at Liverpool University School of Architecture and signalled the end of the dominant pupillage system (Crinson and Lubbock 1994, p. 60). The University presented a model that satisfied the 'art' and 'profession' parties, as well as the RIBA (Powers 1996, p. 4). As a result, the membership of the RIBA's Board of Architectural Education reflected this unity at its first meeting in 1905 (Powers 1996, p. 5). Initially the board advised a syllabus for the Schools of Architecture that adopted a course structure put forward by Lethaby and his 'art' colleagues (Crinson and Lubbock 1994, p. 73). It required a student to complete two years full-time training at a school then undertake two years experience in an architect's office, concluding with a thesis (Crinson and Lubbock 1994, p. 74).

The structure was borrowed from Lethaby's proposal but his peers rejected the central focus on an understanding of materials and construction. It was thought that an association with workshop participation would tarnish the professional image of architects (Powers 1993, p. 35). Most Schools incorporated Lethaby's structure, but the pedagogical model relied on drawing and design (Crinson and Lubbock 1994, p74). This model required limited understanding of construction and creative detailing was penalised (Powers 1996, p.12). By 1910, the RIBA Board of Architectural Education recommended teaching strategies be inspired by the *Ecole des Beaux Arts*, the dominant school in France, as it relied on paper studies (Crinson and Lubbock 1994, p. 75). The Board became a powerful influence on architectural education from its ability to exempt RIBA approved courses from professional examinations (Crinson and Lubbock 1994, p. 89).

Various aspects of the *Ecole des Beaux Arts'* pedagogy had influenced architectural education in many countries (Egbert 1980, p. 5). In particular, it had an immense effect on the United States of America at the end of the 19th century (Crinson and Lubbock 1994, p. 60). The *Ecole des Beaux Arts* was a "post-revolutionary version

of the *Academie Royale d'Architecture*, founded in 1819" (Caragonne 1996, p. 47). From the inception of the French *Academie Royale d'Architecture* to its transformation, the British were generally aware of the structure and teaching strategies but rarely chose to be influenced. The RIBA Board of Architectural Education became interested in the *Ecole des Beaux Arts* in 1909 when it modified by the United States of America, as it did not require the infrastructure behind the French system of private *atelier* (Crinson and Lubbock 1994, pp. 76-77).

The purpose of the *Ecole des Beaux Arts* was to educate students in advanced studies of the arts within a state organised academy. The Beaux Arts education ensured students were taught universal principles of architecture that were derived from the classical orders (Packard 1988, p. 269). Typically, the curriculum contained "construction, lettering, orders, measured drawings, composition and the study of typology and decorum, history, perspective, skiagraphy, sketching and studio design" (Crinson and Lubbock 1994, p. 5).

The annual design competition for senior students, the *Grand Prix de Rome*, is a legacy of the *Ecole des Beaux Arts* that captures the interest, even today, of architectural educators (Egbert 1980, pp. 5,12). Students were directed to consider a design problem and respond with an ideal solution in a short and specified time. This was termed an *Equisse*, a term still in use in schools of architecture today. Later, final drawings were submitted that detailed the *Equisse* solution (Egbert 1980, p. 12).

Another influential approach to design education was developed at the Bauhaus School in Germany, which from the 1920s to 1933 pursued a different model (Wick 2000, p. 15). Wicks argues that the Bauhaus pedagogy in past has suffered from over simplification and misrepresentation. He suggests that the pedagogical model was "richly faceted" as its development was shaped by the three directors (Walter Gropius, Hans Meyer and Mies van der Rohe) and a number of individualistic masters (Oscar Schlemmer, painter, and Johannes Itten, colour theorist) during its short life. Each had strong ideas about design pedagogy (Wick 2000, pp. 11, 12,). This period was also highly charged politically and socially. A Russian writer from this period notes that the school was forced to relocate, three times in all, due to the reactions of "philistines" (Ashton 1997, p. ix).

For these reasons, only the first Bauhaus model is discussed. It represents the strong ideals that in part influenced the following adaptations and developments. Walter Gropius developed the first model in 1921, as he was the founder and first director of the Bauhaus School (Wick 2000, p. 68). Much has been written about Gropius' work and his dominant-status: Fitch claims that he was "the most influential architectural teacher alive..." (1969, p. 7). Ashton remarks that he was an "artful dodger" (Ashton 1997, p. ix) and Naylor describes his talent to have an ideal canonised in Western Europe even though in reality it may have not worked (Naylor 1985, p. 74). Famously, Oscar Schlemmer stated, "Gropius is the Bauhaus" (in Hochman, 1997, p. 5)!

Gropius' model required full-time study(Wick 2000, p. 64). The overall intention of the model was to rationally "merge the best of craft training with all that was valid in the academy" (Fitch 1960, p. 11). Everyone, regardless of ambitions to become painters, craftsmen or architects, was trained together in the workshops (Fitch 1960, p. 11). A tripartite course structure was implemented to reflect the utopian ideal that all classes of society would contribute in some way to the total work of art, or *Gesmantkunstwerk.*

The concept of *Gesmantkunstwerk* dates back to the German Middle Ages and the Baroque and represents the "synthesis of all the artistic genres and crafts engaged in the act of construction". Bauhaus teachers, as in the Arts and Crafts and other romantic movements, strived for this unity(Wick 2000, pp. 15, 64). Surprisingly, Lethaby is not attributed as an influence, but his predecessors Ruskin, Morris and Ashbee are noted (Wick 2000, pp. 17-20).

The first part of the Gropius' tri-partite structure was to provide a foundation in which students undertook a preliminary course in a number of workshops (glass, stone, wood, ceramics, glass, colour, and weaving) ensuring a common education in design and materials. The second part entailed study in a single workshop leading to a certificate of apprenticeship. Some students then elected to commence the third part. In the early years, the third part was concerned with architectural instruction and work on building sites. Under Mies van der Rohe, (the third director of the Bauhaus) architectural instruction was transferred to the second part of the course. It was offered as a specialised course of study in the department of Architecture and

Interior Design. Commercial art, photography, weaving and fine art were also available for specialised study (Wick 2000, pp. 68, 71).

The Bauhaus is acknowledged for the substantial contributions it has made to design education; it is also heavily criticised (Wick 2000, p. 15). According to Naylor, the Bauhaus did not represent an innovative pedagogy as others in Germany, Russia and Holland had already experimented with most of these concepts. In her opinion, the Bauhaus contributed to the changes in the 'perception' of design. Naylor also refers to Oscar Schlemmer's comments in 1921 of its difficult beginning: "that the Bauhaus is a beautiful facade, a concept, and idea for Germany, shored up by the names of a few artists and a programme" (in Naylor, 1985, pp. 9, 74). Following this line of criticism, Dearstyne denounces "Gropius' objective teaching method... students did, in fact depend upon their masters" (Dearstyne 1986 in Caragonne 1996, p. 54).

Aspects of Bauhaus Pedagogy became popular with different groups such as primary school teachers who adapted Itten's work in the arts. The effectiveness of isolating an individual's design principles from the holistic ideologies and context of the school has been questioned (Wick 2000, pp. 11-12). Contrary to this argument, Hochman suggests that the ideologies attached to the Bauhaus may not be necessary. "America's misinterpretation...of the Bauhaus – the one devoid of ideology – turned out to be much more powerful than what the school really had been" (Hochman 1997, p. 267). The Bauhuas was "freed from the dogma and preconceptions of the past, the new architect-trained in the workshop and awakened to his own natural, spontaneous instinct would create a total architecture attuned to a new age" (Caragonne 1996, p. 51).

As with the *Beaux Arts* form of architectural education, aspects of the Bauhaus approach were adopted in many other countries with the teaching 'masters' escaping Germany in the 1930s before the Second World War (Crinson and Lubbock 1994, p. 91). In particular, it left "an enduring mark in America" (Hochman 1997, p. 266). Modernists have also described the Bauhaus as one of the key stimuli for reform in architectural education (Crinson and Lubbock 1994, p. 91).

At this point, it is appropriate to acknowledge the role of modernism in Architectural Education. The period from the 1930s to the 1960s in Britain was characterised by an

interest in public service, town planning, and modernism. According to Colquhoun (2002), Modernism is an ambiguous term that "can be understood... as an architecture conscious of its own modernity and striving for change" (p. 9). Active students, educators and practitioners led this change. The works of Le Corbusier and the Bauhaus in the 1920s were of significant influence. Students successfully campaigned in the 1930s and 1940s for the removal of academic traditions such as the Classical Orders from within the curriculum (Lubbock and Crinson 1993, p. 48).

In the same period from the 1930s to 1960s the profession instigated changes to the curriculum as well but its motivation was driven by professional competition (Lubbock and Crinson 1993, p. 47). Despite the passing of the Architects' registration acts in 1931 and 1938, to guarantee "integrity and competence" the problem still remained that the services of the architect were in competition with those of engineers, surveyors, builders and developers (Kaye 1960, p. 169). The architectural profession could be exclusively distinguished by its design expertise, but its desire to lead the building process meant that a sufficient knowledge in construction and management was required. These subjects were added or reinforced, which meant the period of study was extended. This was perceived as a benefit at the time as it allowed a more comprehensive education for architecture students (Lubbock and Crinson 1993, p. 47).

These actions by the profession, did not resolve the problem. Architects' distaste for salaried employment and involvement in public housing meant that engineers and surveyor controlled building regulations and town planning (Lubbock and Crinson 1993, p. 48). Furthermore, a study published in the RAIA Journal in 1939 confirms that the profession was involved in only 50% of building (Kaye 1960, p. 169). Eventually the leaders of the RAIA professional body were replaced by the new generation, the Modernists (Lubbock and Crinson 1993, p. 49).

Between the period of the 1930s and the 1960s, many educational reforms occurred in Britain resulting in an 'official system'. The 1958 Oxford Conference in Architectural Education significantly acknowledged and protected this development. The policies ratified were that:

1. Courses should be full-time or a combination of full-time study and work experience;

A compromise was reached with the pupillage supporters that after five years full-time study a further two years of experience was required in a registered architects' office.

2. Courses based on the RIBA examinations should be abolished;
3. Recognised schools should be in Universities or Colleges;
4. Entry requirements would be two A levels; and
5. Postgraduate research should be enlarged.

Reference to Modernism was deliberately excluded because the crux of Modernism was that it was in a continuous flux making it inappropriate to define. The Oxford Conference has been described as an unnecessary formality as most Schools of Architecture in the United Kingdom had already adopted the Modernist approach and the other recommendations listed above (Lubbock and Crinson 1993, p. 49).

By 1958, educational reforms in Australia were in parallel with Britain's. This was made possible, first by the RIBA's introduction of a common course structure throughout the British Empire in the 1920s (Powers 1993, p. 38). Second, Australia established a national professional body in 1929, which became the Royal Australian Institute of Architects (RAIA). As a result, each state of Australia successfully achieved an Architects' Registration Act by 1939 (Freeland 1971, p. 231). The Board of Architectural Education was also set up with its supporting committees. Its influence assisted the dominance of the "full-time or part-time courses at universities and technical colleges" over the pupillage system (Freeland 1971, p. 171). By 1940 the Board of Architectural Education was set to accredit the Schools of Architecture (Blythe 1998, p. 51).

With the infrastructure in place, in 1947 the RAIA council endorsed the *Beaux Arts* teaching method, thirty-seven years after the RIBA Board of Architectural Education (*Architecture* 1947 in Blythe 1998, p. 51). Although emerging trends such as postgraduate education in building science, town planning and architectural engineering gained support at the RAIA Architectural Education Conference in 1948 and these trends were included in the 1949 education policy (Freeland 1971, p. 226). Interestingly, the Heads of the Schools of Architecture in Australia and New Zealand in 1950 unanimously rejected the RAIA endorsed teaching method, as "... no useful purpose could be served by the following of the Beaux Arts System..." ('Heads of Schools Conference' 1950 in Blythe 1998, p. 60). The new Joint Board of

Architectural Education resolved this conflict of opinion between the educators and the profession quickly as it administered the accreditation of the various architecture courses in Australia. As four out of the six members were Heads of Schools of Architecture, the overriding will was to replace *Beaux Arts* with the scientific approach (Laybourne-Smith 1949 in Blythe 1998, p. 61).

As a result, by the 1960s, diverse ranges of subjects were offered in Schools of Architecture. The secular focus on design and its artistry expanded to include "the practical and technical subjects of structures, construction, the various building sciences and services, and administration and economics" (Freeland 1971, p. 226). This diversification process continued with the introduction of social sciences, humanities and the development of allied fields such as landscape design, and interior design (Freeland 1971, p. 226).

As demonstrated, Architectural Education in Britain and Australia coincided by the time of the Oxford Conference in 1958. In Lubbock and Crinson's opinion the "official system", the structure, had been set by 1958. Future developments were more related to architectural theories (Lubbock and Crinson 1993, pp. 50-51). It is at this point it is appropriate that the examination of relevant developments in Architectural Education moves to the specific context of Tasmania.

Appendix 3.1 Staff Members Involved in LBM Projects at SA UTas

No.	Initials	Staff Members Involved in LBM studios
1	BB	Bud Brannigan
2	BG	Bruce Goodsir
3	CMc	Catriona McLeod
4	CP	Craig Philcott
5	CP	Corrado Palleschi
6	CR	Chris Roberts
7	DH	Drew Honeychurch
8	FR	Fiona Ranson
9	GF	Gary Frenchman
10	GN	Greg Nolan
11	GVS	Gillian van der Schans*
12	IC	Ian Clayton*
13	JA	Judith Abell
14	JB	Jack Birrell
15	JH	John Hall
16	JH	Justin Hanlon
17	JL	John Lilywhite
18	JMc	Julie McCrae
19	JS	Jad Sylvester
20	JW	John Webster
21	KT	Kate Tregloan
22	LW	Louise Wallis
23	MB	Michael Baxter
24	MP	Matthew Parnell
25	MS	Matthew Skirving
26	PD	Paddy Dorney
27	PS	Prue Slatyer
28	PY	Peter Yttrup
29	RB	Richard Burnham
30	RBl	Richard Blythe
31	RG	Robin Green*
32	RS	Rory Spence
33	SF	Sharon French
34	SS	Steven Sainsbury
35	TW	Tone Wheeler

* Referred to in Chapter 3.0

Appendix 3.2: Literature on LBM and D/B Studios

D/B Studios

Ascher-Barnstone, D 2002, 'Building designs for Living Studio 804 University of Kansas', *Journal of Architectural Education* 55, pp. 186-193.

Auburn University 2002, *Rural Studio: Mission, Auburn University*, viewed 1 November 2002, <http:// www.ruralstudio.com/mission.htm>

Bilello, J 1996, 'Learning from construction', *Architecture*, 85(8), pp. 145-149.

BluePrint Productions 2002, 'The Rural Studio', DVD, United States.

Branch, M 1994, 'Building to learn', *Progressive Architecture*, 75(3), pp. 56-59.

Brouard, P 1997, 'Construction Studios: Yale University', in W. Carpenter (ed.), *Learning by Building*, Van Nostrand Reinhold, New York, pp. 53-62.

Carpenter, W (ed.) 1997, *Learning by Building*, Van Nostrand Reinhold, New York.

Cary, J (ed.) 2000, *The ASCA Sourcebook of Community Design Programs*, Association of Collegiate Schools of Architecture, Washington.

Chun, A and McDonald, T 2002, 'Translation and Materiality: The Space of Invention Between Designing and Building', *Journal of Architectural Education*, 55: 183-185.

Erdman, J and Weddle, R 2002, 'Designing/Building/Learning', *Journal of Architectural Education*, 55, pp. 174-179.

Guilliatt, R 2002, 'This old shack', *Sydney Morning Herald, Good Weekend*, 22 June, p. 40.

Hinders, K 2002, 'Copper: Material, Method of Construction' in an unpublished paper for *Association of Collegiate Schools of Architecture/American Institute of Architects Design /build Conference*, Atlanta.

Ivy, R 1994, 'Rural Education', *Architecture*, 83(October), pp. 62-65.

Jemtrud, M and Cazabon,Y 2002, '1:1 @ Carleton University School of Architecture' *Journal of Architectural Education*, 55, pp. 167-173.

Kroloff, R 1997, 'Southern Comfort', *Architecture*, 86(August), pp. 90-93.

Lerner, K 2002, 'Work: low cost, high design, extra credit', *Architectural Record*, 190(9), pp. 63-64.

Lerner, K 2002, 'A design-build-climb-play project', *Architectural Record*, 190(11), p.[44].

'Mockbee's mission' 1997 *Architecture* 86(1), pp. 49-51.

Mockbee, S 1997, 'Auburn University', in W Carpenter (ed.), *Learning by Building*, Van Nostrand Reinhold, New York.

Miami University, Architecture and Interior Design 2002, *Over-The-Rhine Design Build Studio*, Miami University, Architecture and Interior Design, viewed 1 November 2002, <http://63.210.240.98/Arch-ID/academics/010.04b.html#2>.

Miami University, Architecture and Interior Design 2002, Ghana Studio and Summer Workshop (West Africa), Miami University, Architecture and Interior Design, viewed 1 November 2002, http:// 63.210.240.98/Arch-ID/academics/010.04c.html#2>.

Oppenheimer Dean, A 2004, 'Sam Mockbee: A life's work. AIA Gold Medal Winner', *Architectural Record*, (6), pp. 185-200.

Oppenheimer Dean, A 2001, 'The hero of Hale County Sam Mockbee', *Architectural Record*, (2), pp. 76-82.

Pearson, J 2002, *University-Community Design Partnerships*, Princeton Architectural Press, New York.

Pendleton-Jullian, A 1996, *The Road that is not a Road and the Open City, Ritoque, Chile*, The MIT Press Cambridge, Massachusetts.

POW (1998). The Prince of Wales' Institute of Architecture Exhibition Catalogue 1998. London, Prince of Wales' Institute of Architecture.

PF (2000). Foundation Course - The Build Project (The Prince's Foundation, UK). 2000.

Rumbelow, M 2002, *Building Experiences of a Lifetime, University of South Australia*, viewed 12 September 2002, <http:// www.unisa.edu.au/arc/architecture/patjarr/default.htm>.

Sooter, T 2002, *Students Practice Hands-on Architecture*, Drury University, viewed 29 June 2002, <http:// www.drury.edu/multinl/story.cfm?ID=4650&NLID=48>.

University of Arizona 2002, *Community Outreach Activities of the College of Architecture, planning and Landscape Architecture*, University of Arizona, viewed 29 June 2002, <http:// www.architecture.arizona.edu/outreach/default.htm>.

University of Arkansas 2002, *UA Architecture Students Design and Build Low-Income Home*, University of Arkansas, viewed 9 October 2002, <http:// pigtrail.uark.edu/news/2002/FEB02/DesignBuild.html>.

University of Kansas 2002, *Studio 804, The University of Kansas*, University of Kansas, School of Architecture and Urban Design, viewed 20 September 2002, <http:// http://studio804.com/>.

University of Oregon 1996, *Design/Build at the University of Oregon*, viewed 9 September 2000, <http:// darkwing.uoregon.edu/~sij/WhatIsDB.html>.

University of Oregon, 2002 *Design Build Program, University of Oregon*, viewed 17 June 2002, <http://architecture.uoregon.edu/archgst/special_programs/design-build.html>.

University of Washington 2002, *Virtual Visit: Design/Build Projects/Mexico*, University of Washington, viewed 20 September 2002, <http://depts.washington.edu/archdept/welcome_arch/virtual_visit/design_build_mexico.html>.

Yale University 2002, 'Building Project, Yale School of Architecture', viewed 5 November 2002, <http://www.architecture.yale.edu/>.

Yale University 2003, 'Yale Building Project 2003', viewed 14 March 2004, <http://www.architecture.yale.edu/Flash.htm>.

Yale University 2002, 'Yale Building Project 2002', viewed 5 November 2002, <http://www.architecture.yale.edu/Flash.htm>.

LBM Studios at SA UTas

Birrell, J 1997, 'Passive Solar Greenhouse' in J Vulker and L Johnston (eds), *CHASA referred designs 1995 and 1996*, Queensland University of Technology, School of Architecture, Interior and Industrial Design, Brisbane.

Blythe, R 1998, 'S.W.T. Blythe 1905-1985 Architect and Educator' MArch thesis, University of Melbourne.

Blythe, R 2002, 'Wild at Heart' *Architectural Review Australia*, 79, 26.

Clayton, I 1995, 'Small Buildings and Human Relations/Shed and Toys', *Rethinking the Built Environment, Proceedings of the Catalyst 1995 Conference*, Faculty of Environmental Design, University of Canberra, Canberra.

Clayton, I, Brannigan, B and Green, R 1997, 'Robin's Shed', in J Vulker and L Johnston (eds), *CHASA referred designs 1995 and 1996*, Queensland University of Technology, School of Architecture, Interior and Industrial Design, Brisbane, p. 31.

Clayton, I, Burnham, R, van der Schans, G, Spence, R and Green R 1998, 'The Duck Seat and Rav Shade & Play: To Design and Build Projects for Schools', *Designing Eco-Solutions, Proceedings for Catalyst 1997 Conference*, Faculty of Environmental Design, University of Canberra, Canberra.

Cramer, N 1996, 'Honoring wood', *Architecture*, 85(4), pp 121-125.

Doe, P 1998, 'Head of School's Submission to Review', *Program and School Review. School of Architecture and Urban Design*, Faculty of Science and Engineering, University of Tasmania, Launceston, pp. 21-45.

Green, R 1998, 'Robin's Shed: Submission to the Review Panel', *Program and School Review. School of Architecture and Urban Design*, Faculty of Science and Engineering, University of Tasmania, Launceston, pp. 62-71.

Green, R, Clayton, I Burnham, R, van der Schans, G, Spence, R, Boyer, H and Smith, G 1999, 'The Duck Seat and Rav Shade and Play', in B Busfield and P Richards (eds), *1997-1998 CHASA Referred Design Scheme Catalogue*, Studio School of Architecture and Fine Arts, University of Western Australia, Perth.

Green, R, Clayton, I, van der Schans, G and Brannigan, B 1997, 'Tamar Island Gateway Project' in J Vulker and L Johnston (eds), *CHASA referred designs 1995 and 1996*, Queensland University of Technology, School of Architecture, Interior and Industrial Design, Brisbane.

Green, R and Parnell, M 2001, 'Community and the Student Vernacular: A Review of Six Years Experience of Building with Community Groups in Tasmania', *Community Technology 2001*, Murdoch University, Perth.

Green, R and Webster, J 1998, 'Timber in Architectural Education - Experiments in a Design Workshop Learning', *Proceeding of the 5th World Conference on Timber Engineering*, Presses poltechniques et universitaires romandes, Montreux, Switzerland.

Hobart Architectural Co-operative 1981, *Prospectus*.

Parnell, M. (2002). The Mt Arthur Centre Straw Bale Windbreak and Seat: A Learning Experience in Ecological Building and Community Participation. Australian Association of Environmental Education, Brisbane, Griffith University.

Parnell, M. and M. Dewsbury (2001). Dome - Learning through a process of enablement. Proceedings of the Australasian University Building Educators Association. Constructing and Managing the Built Environment, Adelaide, University of South Australia.

Spence, R 1989, 'Constructive Education', Architectural Review, 185(7), pp. 27-33.

van der Schans, G 1998, 'Missiondale Pavilion' in University of Tasmania (ed.) *Program and School Review*, School of Architecture and Urban Design, University of Tasmania, Launceston, p. 70.

van der Schans, G 1999, 'Learning through making', *Architectural Review Australia*, 69(Spring), p. 28.

University of Tasmania 2000, *School of Architecture: Course Recognition and Accreditation Submission*, University of Tasmania, Launceston.

Wallis, L, Clayton, I, Hall, J and Kelly, A 2004, 'The Changing Role of the Workshop in Architectural Education (a Tasmanian Case Study)' in T Rizzuto (ed.), *The Bauhaus Legacy: Myth, Reality and Reevaluation*, Anthony Rizzuto, Atlanta, Georgia.

Wallis, L, Bromberek, Z, Clayton, I, Green, R 2002, 'Plugging the Gaps: Learning by Making (UTas Case Study)', Modern Practice of Architectural Science: from Pedagogy to Andragogy?, Deaking University, Geelong, pp. 549-556.

Wallis, L 2001, 'Building Better Architecture Students', *Proceedings of the Australasian University Building Educators Association. Constructing and Managing the Built Environment*, University of South Australia, Adelaide, pp. 9 – 21.

Appendix 3.3 Table of Schools of Architecture Emailed and their Response

Region	Country	Learning Institution	Response	Yes – 1:1
Australasia	Australia New Zealand Papua New Guinea	1. Adelaide University 2. University of Auckland 3. University of Canberra 4. Curtin University* (1st yr design studio) 5. Deakin University 6. University of Melbourne 7. University of New South Wales 8. Northern Territory University 9. PNG University of Technology 10. Queensland University of Technology (interior design: furniture)* 11. Royal Melbourne Institute of Technology (not since 1972) 12. University of Newcastle* (2nd yr design studio) 13. University of Queensland (not since 1994) 14. University of South Australia* (Large-scale projects) 15. University of Technology, New Zealand* (Traditional building projects) 16. University of Sydney 17. University of Technology, Sydney 18. University of Western Australia 19. Victoria University of Wellington	12	6
Europe	Sweden Germany England Scotland Wales Ireland Switzerland Finland Poland Russia Austria Denmark France Spain	1. Lund University 2. Muthesius Academy in Kiel 3. Architectural Association 4. Technology University of Zurich 5. RWTH Aachen, Fakultät für Architektur 6. Vaasa Institute of Technology 7. University college, Dublin 8. Cracow University of Technology 9. Moscow Architectural Institute 10. University of Bath 11. The Queen's University of Belfast 12. University of Central England 13. University of Brighton 14. University of Cambridge* 15. Kent Institute of Art & Design 16. University of Cardiff 17. University of Dundee 18. Heriot-Watt University 19. University of Edinburgh 20. Glasgow School of Art 21. University of Strathclyde 22. University of Huddersfield 23. University of Lincoln 24. University of Greenwich 25. Leeds Metropolitan University	6	6

		26. De Montfort University 27. Liverpool John Moores University 28. University of Liverpool 29. Kingston University 30. University of North London 31. Royal College of Art 32. University College London 33. South Bank University 34. University of East London 35. University of Manchester & Manchester Metropolitan University* 36. University of Newcastle Upon Tyne 37. University of Nottingham 38. Oxford Brookes University 39. University of Plymouth 40. University of Portsmouth 41. University of Sheffield 42. Aalborg University 43. Brandenburgische Technische Universitätt Cottbus 44. University of Hannover 45. EPFL ENAC-Ecole d'Architecture 46. University of Geneva* 47. Bauhaus 48. EAPVM - Ecole d'Architecture in Paris 49. Dresden University of Technology* 50. Technical University Madrid 51. Ecole d'Architecture in Normandy 52. Helsinki Technical University 53. Royal Institute of Technology (Sweden) 54. Tampere University Technical 55. Universidad de Navarra (Spain) 56. University of Uolu* (Finland)		
North America	United Sates of America Canada	1. Massachusetts Institute of Technology 2. Illinois University Technology 3. San Fran Institute of Architecture 4. University of Michigan* 5. University of Maryland 6. Dalhouise University* 7. McGill University 8. University of Calgary 9. University of Manitoba 10. University of Waterloo 11. University of Okalahoma* 12. University of Illinois* 13. University of Washington* 14. Kansas University* 15. University of Arizona* 16. Miami University* 17. Montana State University*	10	9
South America	Chile Colombia	1. The Central University, Santiago 2. The University of Chile 3. Pontifical Catholic University of Chile 4. University of the Bio Bio 5. The Catholic University of the	0	0

		North, Antofagasta 6. National University of Colombia, (Bogota,Medelin,Manizales) 7. Pontifical University of Bolivariana 8. Catholic University of Colombia		
Asia	India Hong Kong Singapore Sri Lanaka	1. Manipal Institute of Technology 2. University of Mumbai 3. The University of Hong Kong 4. Chinese University of Hong Kong 5. The National University of Singapore 6. University of Moratuwa	0	0
Africa	Kenya South Africa Ghana	1. Jomo Kenyatta University of Agriculture and Technology 2. University of the Free State 3. The University of Cape Town 4. University of Natal 5. University of the Witwatersrand* 6. University of Port Elizabeth 7. University of Pretoria* (interior design: furniture) 8. Kwame Nkrumah University of Science and Technology, Kumasi (Ghana)*	3	3
Middle East	Israel	1. Technical University	0	0

Appendix 3.4 List of LBM Objectives from Unit Outline (SA UTas): 1994 to 2002

Objectives	Yr levels	Lecturer
Have practiced team work skills to a level where students appreciate the coordination required to make a small building	all	IC11
Be able to demonstrate modelling and workshop skills to a level that shows confidence in experimenting with detail and construction	all	IC6,7,8,9,11
Have appreciated and practiced design skills required for proposals using on a limited range of materials	all	IC6,7,8,9,11
To ensure workshop experiences are good ones, such that a workshop environment is seen as valuable home for design experiment and study.	all	RB2, IC1, 5
To introduce and practice team approaches in design that develop fundamental respect between all involved; and to formalise this respect and allow students to take unconditional responsibility for a finished product.	all	RB2, IC1, 5
To manage time and process so that confidence and enthusiasm for making becomes an integral part of design thinking.	all	RB2, IC1, 5
To encourage supportive study relations between students	all	RB2, IC1,5
Design and assembly of components	2-3	BG1
Research current design issues in relation to subject of study	2-3	BG1
Sustainable use of resources	2-3	BG1
Three dimensional design studies	2-3	BG1
Timber-Tasmanian context	2-3	BG1
Demonstrate an understanding of the site analysis and its relationship to design	2-3	GN1,2
Demonstrate an ability to work in teams and schedule workloads	2-3	GN1,2,3
Demonstrate an understanding of the fundamentals of timber construction	2-3	GN1,2,3
Demonstrate an understanding of architecture and technical research and practice	2-3	GN3
Advance and further develop personal skills in design thinking through group discussion	2-3	GVS4
Advance workshop and making skills and an understanding of different fabrication techniques	2-3	GVS4
Develop a clearer understanding of design in relation to specific site, brief and budget limitations	2-3	GVS4
Develop a greater understanding of issues associated with architecture in the wilderness and issues of sustainability.	2-3	GVS4
Improve design communication skills with clients and peers, whilst developing a greater understanding of the co-operative nature of architectural design	2-3	GVS4
Appreciate the essential relations between design thinking and perception, and final designs	2-3	IC10
Be able to demonstrate modelling and workshop skills to a level that shows confidence in experimenting with design concepts and detail design	2-3	IC10
Have appreciated and practiced design skills required for proposals based on a strict budget	2-3	IC10
Have practiced team work skills to a level where students appreciate the coordination required to develop and respond to real design briefs	2-3	IC10
An ability to develop designs using techniques of modelling and workshop experiment	2-3	IC2
An ability to propose design solutions that have relevance and value to all concerned	2-3	IC2
An appreciation of design principles in, investigation, analysis and strategy selection	2-3	IC2
Skills in design discussion, development and communication	2-3	IC2
To make a building in one week with 36 first year students	2-3	IC2
Circulation and planning (DESIGN AND MAKING ABILITIES)	2-3	JB1,2
Design investigation and research	2-3	JB1,2
Design practice, where by design ideas are supported by a responsible	2-3	JB1,2

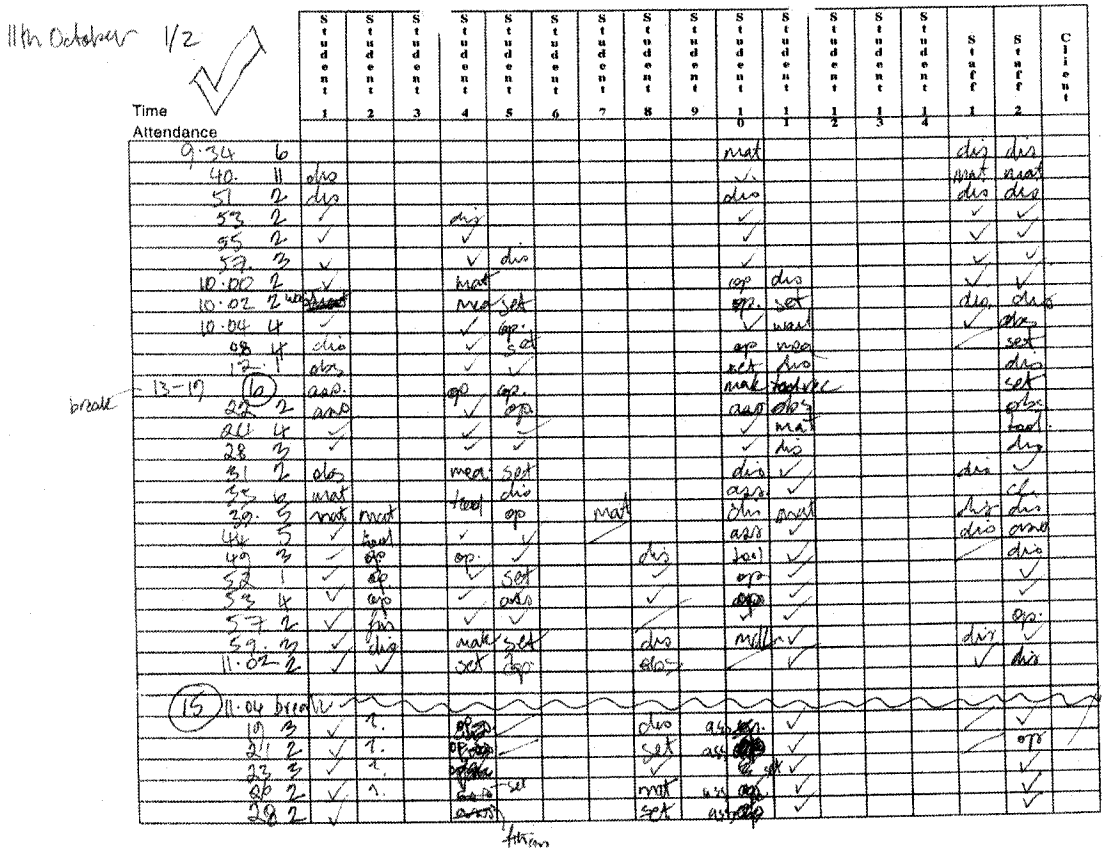
decision making process and are clearly communicated to others, for critical comment		
Form, scale, context and research	2-3	JB1,2
Human comfort and climate (DESIGN AND MAKING ABILITIES)	2-3	JB1,2
Structure, detailing and assembly	2-3	JB1,2
To participate with reasonable equity, within a group, in the making of a small structure	2-3	JB1,2
To experiment and explore the possibilities and limitations of wood as a material in Architecture	2-3(?)	JW1, 2
To research existing uses of wood and associated technology	2-3(?)	JW1, 2
To undertake applied design research	2-3(?)	JW1, 2
To contribute to individual student portfolios illustrated reports that reflect the learning experience of; research, design and building	2-3	JW3
To contribute to team discussion and decision making	2-3	JW3
To explore and understand issues of timber detailing within the context of a full-scale experimental building construction	2-3	JW3
To fabricate and erect a timber structure at the Department of Architecture Hollybank Timber Experimental Area	2-3	JW3
To prepare conceptual design ideas	2-3	JW3
To research the fundamentals of timber construction technology particularly timber jointing methods	2-3	JW3
To understand the teamwork and organizational inputs required in building construction	2-3	JW3
An appreciation of the issues involved in design and construction of buildings for the "majority world"	2-3	MP1
A working knowledge of common technical strategies for building with earth and other low embodied energy, natural and local materials	2-3	MP1-2
An understanding of how to develop strategies which facilitate a building project	2-3	MP1-2
An understanding of the issues of self-help building and local participation, and how these can support community development	2-3	MP1-2
Manual skills in basic earth building and other techniques	2-3	MP1-2
An ability to work in groups	2-3	MP2
To develop an understanding of the process of construction (including council applications, costing, project management, actual construction)	2-3	PS1
To develop building skills	2-3	PS1
To develop knowledge of detail design and documentation	2-3	PS1
To extend an understanding of materials and their application	2-3	PS1
Advance an understanding of the properties and design potential embodied in various building materials	1,2-3	GVS2,3,4
Develop a clearer understanding of some of the issues associated with design detailing and durability	1,2-3	GVS2,3,4
Realise design ideas in one to one form and further develop an understanding of the implications associated with the crossover from design to making	1,2-3	GVS2,3,4
Appreciate the essential relations between design thinking and perception, and a finished, real object.	1,2-3	IC,6,7,8,9
Have practised teamwork skills to a level where students appreciate the coordination required to develop and respond to a brief, design and make small constructions.	1,2-3	IC,6,7,8,9
Develop a design that understands the relationship between structure and materials	1	GVS1
Have a improved understanding of materials being used	1	GVS1
Understand a building scale and relationship to place	1	GVS1
To advance an understanding of the connection between the realised design and the drawing	1	GVS2
To advance design skills	1	GVS2
To begin to understand some of the issues associated with post occupancy research	1	GVS2
To develop an understanding of some of the ecological and environmental issues associated with design intervention	1	GVS2
To advance group skills and develop an understanding of the co-operative nature of architectural design	1	GVS2,3

To advance students understanding of council and building regulations and their impact on design	1	GVS2,3
To advance workshop and making skills	1	GVS2,3
To develop a clearer understanding of design in relation to specific site limitations	1	GVS2,3
To advance and further develop individual design thinking	1	GVS3
To develop a clearer appreciation of scale and three dimensional form	1	GVS3
To develop a greater understanding of basic structural principles and issues	1	GVS3
Develop group work skills to a level where students appreciate the complexity and coordination required to make a simple building	1	IC3
Ability to work as a group and ability to communicate with other groups in the development of a design solution	1	IC4
Assistance to other groups and a determination to realise the project. Ability to accept responsibility and meet deadlines	1	IC4
Consideration of the site issues in the development of design response, such as; land form, climate, vegetation and sensory issues. Exploitation of these potentialities to, "build new connections and develop deeper meanings" (Lynch 1988,pp32)	1	IC4
Creative and meaningful expression of design ideas, appreciating place making	1	IC4
Demonstrated attitude to open inquiry and free experiment, creative design.	1	IC4
Demonstrated understanding of the relation of materials to the expression of design ideas	1	IC4
Workshop skills, accuracy and care in making	1	IC4
To make a building in 12 days with arch students of Aust.	1	IC5
To design and make a building system in 13 days	2-3,4	RB2
Develop appreciation of the opportunities and difficulties that arise in translating design concepts in to constructional reality	5	RB1
Develop group work skills to a level where students appreciate the complexity of a construction project and the co-ordination necessary to manage it successfully.	5	RB1
Learning workshop skills to a level where students have confidence in experimenting with basic construction	1 + 5	RB1, IC3
Develop an attitude to detailing that respects open enquiry and creative thinking skills essential to good design.	1 + 5	RB1, IC3

* Refer to Appendix 3.1 for Staff abbreviations

The numbers next to the staff initials represent the number of unit outlines/ LBM studios

Appendix 5.1: An Example of Observation Schedule Sheet from Study 1A



Appendix 5.2: Classification of Categories into Design and Production Activities in Study 1A

			12204	12202	12213	12211	
Active %	Primary: Design Activities %	*Problem Solving (Design)*	2.077	5.266	3.267	5.368	
		Research	2.262	1.699	1.372	0.529	
		Verbal Communication	14.8	13.1	11.89	16	
		Group Dis/List/Obs	2.028	1.775	0.984	1.76	
		Model making	6.48	6.165	3.102	6.568	
		Note taking + Listening	1.029	0	0	0	
		Sub-Total %	28.67	28	20.61	30.23	
	Secondary: Production %	*Assisting*	1.998	2.006	2.572	3.892	
		Cleaning up	1.118	0.85	1.044	1.103	
		Construction	15	14.61	14.2	16.41	
		Observing	5.57	0.746	3.997	0.582	
		Set out	3.452	0.403	1.745	2.214	
		Walking + Observing	4.295	5.366	3.147	4.456	
		Sub-Total %	31.44	23.98	26.7	28.66	
Inactive %		*Rest Break*	6.875	3.039	5.861	3.158	
		Unaccounted	15.41	9.798	13.27	17.85	
		Away	17.61	35.18	33.55	20.11	
		Sub-Total %	39.89	48.02	52.68	41.11	
		Total %	100	100	100	100	

Description of Observation Categories for Study 1A and 1B

	Final Categories	Categories	Description
1	Drawing (Initiated in **Study 1B**)		Student: Hand and computer aided drawing to explore, explain, calculate or operate the CC router. In the case of **Study 1B**, let also included design drawing. Lecturer: Hand drawing to assist student's exploration and explanation of design and production ideas
2	Group Dis/List/Obs (Discussion/ Listening/ Observation)		the entire group gathers to discuss and review progress. (Category used when it was difficult to record individual data)
3	Model making		using timber materials cut to scale of 1:10 and 1:5 to explore design and construction ideas
4	Note taking and listening		Student: taking notes from client, lecturer or workshop manager in reference to the project

Appendix 6.4: Questionnaires Result for Study 2

37 of 40 the students responded to part 1/2:

"LEARNING THROUGH MAKING" SURVEY PART1/2

All information collected will remain strictly confidential, student names will not be published.

Identification Code:

Q1 How many year levels of study have you survived?

a)	1 year	3%
b)	2 years	46%
c)	3 years	3%
d)	4 years	21%
e)	5 years	8%
f)	6 years	3%
g)	Graduate	13%
h)	Other, please specify:	5%

Q2 Is this your first "Learning through Making" experience at this School of Architecture?

a)	Yes (Please go to Q4)	87%
b)	No	13%

Q3 How many "Learning through Making" studios have you participated in? *Including experiences from first year design studios, specialised studios, summer workshops and this studio*

a)	2	43%
b)	3	43%
c)	4	0%
d)	more than 4	14% (6 students responded to Q3)

Q4 Which statement best represents why you have selected to participate in this Design and Construction Project?

a)	It is a special professional interest	24%
b)	To gain academic credit	0%
c)	Both a and b	76%

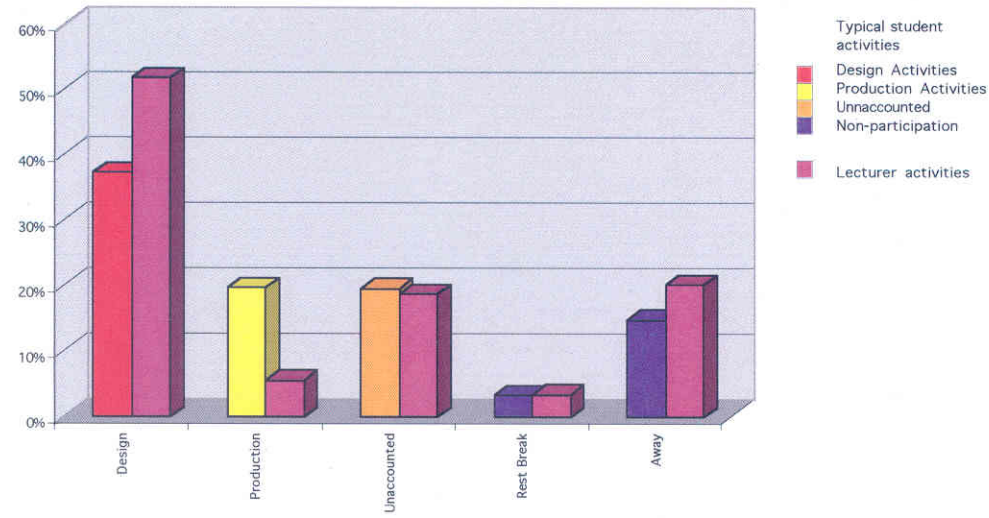
Section 2: This section relates to your previous making experiences. If more than one response is appropriate please circle each one.

Q5 When you were a child did you enjoy any of these types of play?
Please only circle the responses that you would have played, at least once a week:

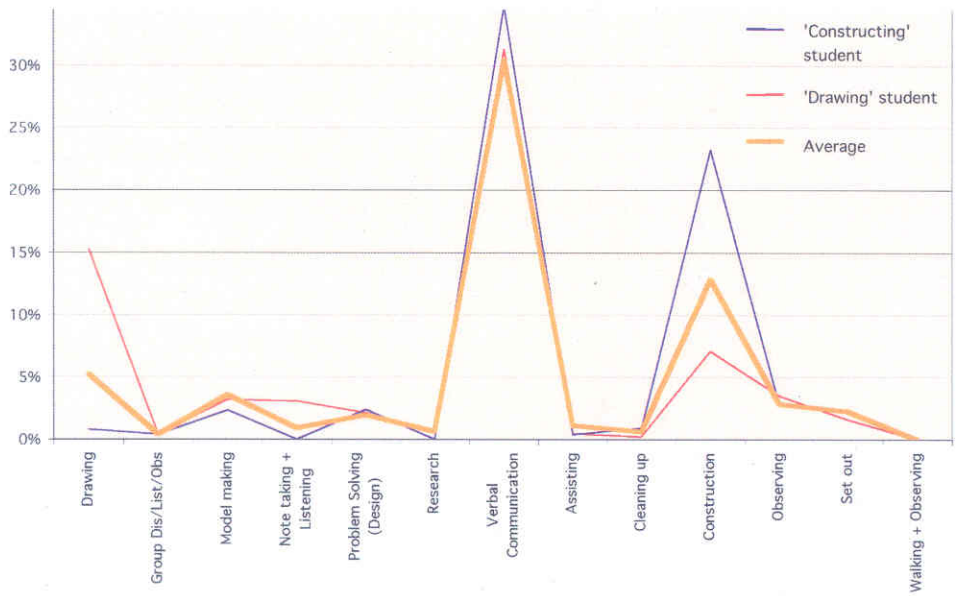
a)	Lego	87%
b)	Blocks	54%
c)	Drawing and painting	74%
d)	Constructing in the sand pit or at the beach	62%
e)	Other, please specify:	15%

5	Problem Solving (Design)	Designing	exploring ideas by drawing and model making to scale
		Decision making (design)	a discussion was held between team members to make a critical decision about the design, material, production and installation
		Brainstorming	discussing potential ideas of how to respond to the brief in a group
		Brief generation/reflection	reviewing the brief criteria to the design proposal
		Organisation	organising timeline and programs
6	Research	Collecting information	researching materials, suppliers, and manufacturing processes that were appropriate and affordable to the installation
		Interpreting information	translating ideas and research to form part of the design
7	Verbal Communication	Discussion	a discussion held between team members and/ or Lecturer concerning the design project
		Listening	listening to another peer discuss and idea, decision or process related to the project completion
8	Assisting		assisting another team member in model making, computer aided drawing, calculation of materials and producing installation
9	Cleaning up		at the end of session putting all tools back in the store and removing rubbish and materials from the bench tops and floor
10	Construction	Finishing	the sanding, oiling and painting of a material
		Materials/Tools	collecting and returning of materials and tools from the workshop and on site
		Operating Equipment	operating tools or machinery
		Installation	installing projects on site
11	Observing		observing a peer or staff member in terms of operating machinery or tools
12	Set out	Set out	laying out components for assemblage
		Measure/ Recording	as title suggests
13	Walking and Observing		specific category for **Study 1A**, students and lecturer spent a lot of time during site analysis, walking and observing to determine potential sites
14	Unaccounted		accounts for a rest break for researcher or student/lecturer is outside the observation area
15	Rest Break		individuals determined their own rest periods as the day's work was long and demanding
16	Away		absent for observation period

Appendix 5.3 Comparison of Design versus Production Activities in Study 1B



Appendix 5.4 Comparison of 'Constructing' Student Activities to 'Drawing' Student Activities



Appendix 5.5 Questionnaire Results from Study 1A

13 of 13 students responded to part 1/2:

"LEARNING THROUGH MAKING" SURVEY PART1/2

All information collected will remain strictly confidential, student names will not be published.

Identification Code:

In the questions below please circle your response

Q1 **Is this your first "Learning through Making" studio?**

a)	Yes	0%
b)	No	100%

Q2 **How many "Learning through Making" studios have you participated in? (Including experiences in first year design studios and summer workshops)**

a)	None	0%
b)	1	0%
c)	2	0%
d)	3	54%
e)	More than 3	46%

Q3 **Which statement best represents why you have selected this specialised studio:**

a)	I was interested and want to improve my knowledge in making.	92%
b)	This wasn't my first preference but I enjoy doing a studio in the workshop	0%
c)	I was allocated to this studio	8%

Please circle the type of learning experience that you feel would be most valuable to you from each item (Q4 to Q12). If more than one is appropriate, please circle each one.

**Results are not shown for Questions 4 to 12, as some students elected not to fill these out

Q4 **Development of Communication skills:**

a) Improve communication skills (verbal and visual) with clients and trades people.
b) Ability to prepare drawings for construction, that others can understand independently.
c) Planning what type of visual and verbal communication will be effective in presenting ideas to the client

Q5 **Re-informing the design process by exploring construction:**

a) By exploring many solutions, you devise a detail that requires minimum maintenance and labour.
b) Being able to Identify and evaluate detail solutions by modeling.
c) Being able to identify a detail solution by modeling

Q6 **Development and appreciation of team working skills:**

a) Being part of a team that manages (communication) the demands of clients, lecturers and peers
b) Further develop personal skills to work in a team
c) Understanding the benefits of collaborative design

Q7 **Realisation of a scale model to "actual" dimensions:**

a) Devise dimensions of different functions and activities from first principles
b) By exploring, understand the different relationships between scale and the level of detail required.
c) Realisation of scale, understanding the scale of model to actual size.

Q8 **Better awareness of the process of architecture:**

a) An overview of the process of Architecture
b) Being able to identify and schedule the sequence of events
c) Understand and manage the consequences of decisions and deadlines.

Q9 **Research and explore different techniques to fix and combine materials:**

a) Resolving issues through construction
b) Develop a clever design that requires minimum fixings and labour.
c) Research examples and understand why some details require less maintenance

Q10 **Understand the capacity and structure of materials:**

a) By exploring, understand the principles of structural forces and bracing required in a small installation
b) Understanding the different strengths and weakness of materials. (i.e. compression, tension, etc)
c) Exploring the properties of materials

Q11 **Development of construction skills in the workshop:**

a) Discipline and craftsmanship required to build a public installation
b) Manual experience in operating power tools
c) Being able to understand and employ the tolerances required between materials and erection on site

Q12 **Understand critical relationships in the formation of Architecture:**

a) Understand the critical relationship between client and architect; design and making; and context and needs of the local area.
b) How decisions are made and who needs to be involved
c) Design and manage a successful public project

Q13 **Please rank the priority of these learning experiences for you in this specialised studio, from 1 to 9 on this sheet. (1 being the most important, through to 9 the least important)**

Learning Experiences	Rank (1 to 9)
Development of Communication skills	4
Re-informing the design process by exploring construction	3
Development and appreciation of team working skills	6
Realisation of a scale model to "actual" dimensions	8
Better awareness of the process of architecture	2
Understand the capacity and structure of materials	5
Development of construction skills in the workshop	9
Research and explore different techniques to fix materials	7
Understand critical relationships in the formation of Architecture	1

Thank you for your participation, these results will be compared with data observed in studio and final evaluation of your experience. Please be assured that this information is strictly confidential and will not influence your assessment. Data will only be presented in a manner that will not allow participants to be identified. Generic data from this survey will be available for viewing in the following week

Louise Wallis.

10 of 13 students responded to part 2/2:

"LEARNING THROUGH MAKING" SURVEY PART2/2

All information collected will remain strictly confidential, student names will not be published.

Identification Code:

The first section of this survey relates to your previous experiences of making before studying the Bachelor of Environmental Design at the University of Tasmania. Please circle your response, If more than one response is appropriate please circle each one.

Q1 **When you were a child did you enjoy any of these types of play?** *(Please only circle the responses that you would have played, at least once a week):*

a)	Lego	100%
b)	Blocks	10%
c)	Drawing and painting	100%
d)	Constructing in the sand pit or at the beach	50%
e)	None of the above	0%

Q2 **Before you commenced your Environmental Design studies at the University of Tasmania did you choose to build, sew or make things?**

a)	Build (for example dog kennel or a shed)	80%
b)	Sew (for examples clothes, a kite, or sails)	20%
c)	Make things (for example models, or a billy cart)	90%
d)	None of the above	0%

Q3 **Which type of learning format do you think best represents what you respond to and gain most from?**

a)	Information is presented by lecture and notes and assessed by the application of knowledge in assignments.	10%
b)	Information is presented by lecture and notes and assessed by examinations.	0%
c)	Information is presented by lectures, group discussions and assessed by the analysis of work presented.	30%
d)	Guided self learning towards a set project	50%
e)	Base information is presented and students physically explore and experiment to gain further knowledge.	50%

The second section relates to your learning experiences and motivation gained from the Specialised Studio completed in Freycinet National Park. If more than one response is appropriate, please circle each one.

Q4 **Do you feel that from your participation in this specialised studio that you gained or improved your knowledge from any of the learning experiences listed below:**

a) Development of Communication skills
b) Re-informing the design process by exploring construction
c) Development and appreciation of team working skills
d) Realisation of a scale model to "actual" dimensions
e) Better awareness of the process of architecture
f) Understand the capacity and structure of materials
g) Development of construction skills in the workshop
h) Research and explore different techniques to fix materials
i) Understand critical relationships in the formation of Architecture
j) Any other learning experiences not mentioned. Please describe:

_____

Results presented in Table 5.1, p90

Q5 **Were any of these learning experiences circled in the previous question unique to "Learning through Making" studio that you believe benefited your architectural education.** *(Please circle the learning experiences that were unique and beneficial to your learning below.)*

a) Development of Communication skills
b) Re-informing the design process by exploring construction
c) Development and appreciation of team working skills
d) Realisation of a scale model to "actual" dimensions
e) Better awareness of the process of architecture
f) Understand the capacity and structure of materials
g) Development of construction skills in the workshop
h) Research and explore different techniques to fix materials
i) Understand critical relationships in the formation of Architecture
j) Any other learning experiences not mentioned. Please describe: _____

Results presented in Table 5.1, p90

Q6 **Do you think any of these learning experiences assisted your work in Design studio this semester?**

a) No 50%
b) Yes. Please describe: _____ 50%

Q7 **Do you think any of these learning experiences assisted your work in Building Technology this semester?**

a) No 50%
b) Yes. Please describe: _____ 50%

Q8 **Do you think you gained enough learning experiences from the time you spent to realise this project in comparison to other subjects?**

a) Yes 100%
b) No. Please describe: _____ 0%

Q9 **Were you excited, satisfied or disappointed by your project outcome:**

a) Excited 73%
b) Satisfied. 18%
c) Disappointed 9%

Q10 **Do you think your emotional response to the project outcome affects your learning and motivation?**

a) Yes 100%
b) No. Please describe: _____ 0%

Q11 **Do you think your motivation and attitude to this "Learning through Making" studio would change if the projects were not built to benefit the community?**

a) Yes 8%
b) No. Please describe: _____ 92%

Q12 **Do you feel more confident and motivated to undertake another building project at the School or elsewhere?**

a) Yes 100%
b) No. Please describe: _____ 0%

Thanks for your participation and commitment to this study. Cheers Louise.

Appendix 5.6 Preliminary Analysis of Existing Questionnaire to Determine Common Learning Experiences in LBM Studios

In 1999, Gillian van der Schans, informally surveyed her LBM studio. These students were in first year and this was the second LBM studio. To determine the common learning experiences in LBM for this study questionnaire an analysis of students' responses was undertaken, resulting in the following list.

Common Learning Experiences
Development of Communication skills
Re-informing the design process by exploring construction
Development and appreciation of team working skills
Realisation of a scale model to "actual" dimensions
Better awareness of the process of architecture
Understand the capacity and structure of materials
Development of construction skills in the workshop
Research and explore different techniques to fix materials
Understand critical relationships in the formation of Architecture

Examples of student's survey responses and issues identified from one question asked students to identify how LBM was beneficial to their learning

"Spatial qualities are easier to see in models. Models are more realistic and you have to understand how things go together" "the issue of space and buildability"	Realisation of Space and Scale through modelling and building
"The actual building process gave us a great deal of satisfaction as well as showing us the difficulties of building construction."	Satisfaction from learning process, Identify and understand the implication of decisions in building and design
"need for practical experience in learning about architecture"	Understanding Profession: Recognising the different skills and qualities need by an Architect
"calling in after project completion and realising what has happened"	Reflection, Satisfaction from completed community project
"It helps with Building Technology theory; because it is easier to see how a plan, drawing... relates to actual space."	Realisation of space and visual communication
"amazed on what myself and the class could achieve....actually achieving two buildings at a high level	Reflection, Satisfaction from completed community project, Self-belief – Confidence.
Modelling "clearer to understand" "Looking at the design models and drawings, then exploring the finished building, my sense of scale changed."	Realisation of Space and Scale through modelling and building
"you learn that even the best ideas are useless if they cannot be built(realised)"	Process of Architecture (big picture)
"as well as teaching us about joints and fixings etc – it was also an excellent team building exercise."	Group dynamics and learning
"we got 80- 90% of our fixings etc wrong the first time but we learnt to recover and be inventive"	Learning through making, problem solving process
" I have learnt that even the most disgusting colours can look not so disgusting if used properly"	Exploring and learning from the "real" process

"we all learnt things that can only be realized through experience – no amount of lectures could have taught us as much" (understanding structure and better teamwork) "the limits of the materials can be seen"	Easier to learn/understand/retain information concerned with building. Learning through making. Real evidence.
Modelling "you can see and experiment with connections, limitations, design etc where as in drawing studio you have to see these elements in your mind "	Appropriateness of learning type due to complexity and experience level
"best aspect the people to people experiences"	Client needs, Communication
"the columns for the weather board cladding seemed a little wobbly till the roof was set up. Then you could even walk on the laser-lite roof and the structure would not shake" Understanding pre-fabrication due to time and distance	Easier to learn/understand/retain information concerned with building. Learning through making. Real evidence.
"Much more interesting than just sitting in the classroom. Finished product encourages confidence."	Motivation for different learners, Confidence
"The actual construction, creation of joints dictate very much the shape and outcome of the project"	Process of Architecture – realisation
"makes you be precise with measurements"	Implications of building and communication
"I hear and I forget, I see and I remember, I do and I understand"	
Understanding materials and testing it's limitations	Understanding building
"The distance from that to the boards is a bit far – you'd be lucky to remain dry in there on a rainy day! I guess we learn from our mistakes"	Evaluating, Identifying more considerations to be appreciated when designing and making decisions
think it is a case of "hit and miss" and that more concrete learning – perhaps tutorials on how doors are normally made	Adjustment to new learning type, thirst and motivation for more knowledge
"It enables you to realise any errors, where as drawings tend to allow more mistakes go unseen"	**Making requires more discipline, thought and accuracy because it needs to function – the drawing does not have the same implications, understand by making it or computer modelling (ArchiCAD, form z exploration, simulation of reality where as compared to AutoCAD etc) Realisation of materials – what it is**

Other questions inquired whether students gained more skills and knowledge from their second LBM studio, and what skills and knowledge was improved from this activity in their first and second LBM studio.

Appendix 5.7 Abbreviations Used for the Nine LBM Learning Experiences

Learning Experience	Abbreviated Form
Development of communications skills	Communication skills
Re-informing the design process by exploring construction	Re-inform design by construction
Development and appreciation of team working skills	Team-working skills
Realisation of a scale model to 'actual' dimensions	Realisation of scale
Better awareness of the process of creating architecture	Process of Architecture
Ability to research and explore different techniques in fixing and combining materials	Techniques to fix materials
Ability to understand the capacity and structure of materials	Materials capacity
Development of construction skills in the workshop	Construction skills
Ability to understand the critical relationships in the formation of architecture	Critical relationships

Appendix 5.8: Questionnaire Results from Study 1B

Section 1: Just some facts about you! In the questions below, please circle your response
16 students completed this survey on 16/3/01

Q1 **Which year level are you currently studying?**

a)	2nd year	56%
b)	3rd year	31%
c)	Other, Please describe:	13%

Q2 **Are you a new student this year, to the School of Architecture?**

a)	Yes (go to Q4)	6%
b)	No	94%

Q3 **Is this your first design and making experience at 1:1 at this School of Architecture?** (15)

a)	Yes (Please go to Q4)	47%
b)	No	53%

Q3 **How many "Learning through Making" studios have you participated in?**
Including experiences from first year design studios, specialised studios, summer workshops and this studio (16)

a)	2	6%
b)	3	13%
c)	4	19%
d)	more than 4	13%

Q4 **Which statement best represents why you have selected to participate in this Design and Construction Project?**

a)	It is a special professional interest	38%
b)	To gain academic credit	6%
c)	Both a and b	56%

Section 2: This section relates to your previous making experiences. If more than one response is appropriate please circle each one.

Q5 **When you were a child did you enjoy any of these types of play?**
Please only circle the responses that you would have played, at least once a week:

1.	Lego	81%
2.	Blocks	44%
3.	Drawing and painting	94%
4.	Constructing in the sand pit or at the beach	63%
5.	Other, please specify:	6%

- doll's furniture out of boxes

Q6 **Did you ever build, sew or make things?**

a)	Build (for example dog kennel, furniture or a shed)	63%
b)	Sew (for examples clothes, a kite, or sails)	38%
c)	Make things (for example models, or a billy cart)	81%
d)	Other, please specify:	

Q7 ***At High School and College did you ever participate in a wood or metal working subject?***

a)	Yes, a wood working subject	94%
b)	Yes, a metal working subject	38%
c)	No	6%

Q8 **Have you been physically involved in building a house?**

a)	Yes	31%
b)	No	69%

Section 3: Personal Learning Experiences

Q9 **Please rank the priority of these learning experiences for you in this designing and making studio, from 1 to 8 on this sheet.** (1 being the most important, through to **8 the least important**. Please do not give the **same** ranking to different experiences.)

Learning Experiences	**Rank (1 to 8)**
Development of Communication skills *(between team members, peers, clients & consultants)*	7
Re-informing the design process by exploring making	4
Development and appreciation of team working skills *(design and making)*	8
Realisation of a scale model/drawing to "actual" dimensions	5
Better awareness of the process of architecture *(design and making)*	2
Investigate and understand the capacity and structure of materials	1
Development of construction skills in the workshop	3
Research and explore different techniques to fix materials	6

Q10 **Please describe if there are any other important learning experiences that you expect to learn from this design and making studio.**

- expect to learn more about self critique (question my own resolutions)
- love working with my hands, turning my designs into reality
- gain confidence with machinery
- to actually build something for once

Q11 **Do you have a preference to design and make for a group or community or for oneself?**

a)	Group and Community	0%
b)	Oneself	25%
c)	Both a and b	75%
d)		

Q12 **Which type of learning format do you think best represents what you respond to and gain most from?**

a)	Information is presented by lecture and notes and assessed by the application of knowledge in assignments.	19%
b)	Information is presented by lecture and notes and assessed by examinations.	0%
c)	Information is presented by lectures, group discussions and assessed by the analysis of work presented.	38%
d)	Guided self learning towards a set project	6%
e)	Base information is presented and students physically explore and experiment to gain further knowledge.	50%

Appendix 6.1: Analysis of Observation Results from Study 2

A copy of this analysis was sent to Student 1, Student 2, Lecturer 1 and Lecturer 2 for informant feedback (includes Appendix 6.1a, b and 6.2):

Study 2: Australian Timber Workshop, Stream 2

13 days, February 2001

Objectives:

1. To investigate if design and detailing issues are discussed concurrently.
2. To gain a better understanding of what issues are discussed and the interpersonal responding style used.

Method:

An electronic recording sheet was devised prior to the workshop. (Refer to Appendix 6.2) Conversations were directly interpreted and recorded in three different categories.

1. Content
2. Relationship to design or construction
3. Interpersonal responding style (Johnson, 1997, pp. 196 - 203)

The length of conversation was excluded from this study; a record was initiated by the recognition of a category. A trial period was required in the first two days as the categories and the process were refined by studio observations. The demand of this type of investigation restricted the number of students to be observed, to three.

Student Sample:

Though students were selected at random, they co-incidentally shared similar traits. All students were to commence their fifth year of studying architecture immediately after this workshop. Two had prior qualifications resulting from previous studies. Consequently, this small sample represented confident and mature students who

exhibited strong leadership skills. Despite these traits, these students, like most of the group, had limited building experience.

Problems with the Study:

The main challenge was to maintain consistent recordings, as sessions were long. For example, sessions were held for up to seven continuous days. These days were long, beginning at 9:30am and concluding at 10:00pm. The requirement to be in close proximity to the students to hear their conversations was initially an awkward task. It did not appear to affect the students as they thought the study was interesting and they regarded it as a privilege to be selected. Once construction began, it was more difficult to interpret conversations, due to the industrial noise and ear protection worn. However, these conversations were less frequent and louder. The results indicated that the category to distinguish whether the issue was design or construction related, was unsuccessful. This was remedied by referring to the content categories of "Form/Qualities" and "Buildability".

Results:

Day 1-4: Design phase

In the first four days, the conversation content largely centered on the category "Form/ Qualities". (Refer to Appendix 6.3 for graphed results.) This was not a surprising result as this was a part of the design phase. During this period "Buildability" issues were mostly of a secondary concern, though the relative importance of "Buildability" rose on Day Two to be equivalent to "Form/ Qualities" and continued to surge. This strong trend reflects two circumstances, the teaching strategy (dominant use of scale models) and the consciousness that the design was to be built within the fortnight. Of the three, Student 1 introduced organizational issues on the first day. The other students' concern, grew over the following days. The projects "Constraints" were discussed but there was no overriding trend. "Constraints" was the only content category that did not dominate.

The responding styles of the three students on the first day were disparate and showed no consistent trends. Both student 1 and 3 recorded an even distribution. Student 1 had the highest record for "No" throughout this study. In contrast Student

2, demonstrated in their discussion of design issues a dominant "Evaluative" style, supplemented by the "Probing" style. By the second day, the students' results converged. The "Evaluative" style was principal responding style. This trend suggests that the students relied more heavily on personal opinions during the design phase. During this period, students grappled with collaborative design process, as there was a smattering of "Interpretative" and "Probing" styles recorded.

Day 5-6: End of the Design phase

From the fifth day "Buildability" became the main focus for conversation content, up to the eleventh or twelfth day. However the fifth and sixth day still belonged to the design phase. This trend reflects the tasks set by the lecturers. Students were asked to make a 1:10 presentation model for the client meeting. This ensured that "Buildability" issues were at the fore of conversation as the scale of the model was large and required detail resolution.

Day 7-12: Construction phase

"Buildability" issues continued to be the principal content of discussions. Some of these issues that were discussed more frequently were detailing, structural design, materials and setout. On Day 9, each student's dialogue was centered on where to find tools and machinery and how to use them. The setout, also dominated the students' content on Day 11.

Between the end of the design phase and throughout the construction phase, Students 2 and 3 demonstrated a more evenly distributed level of responding styles. This suggests that the "new" experiences of estimating materials, using machinery and making, caused a variety of responding styles to be used, representing students learning and managing new tasks. Student 1 drafted the group's design to assist the process of determining accurate dimensions. Consequently, Student 1's prior experiences were not challenged. The responding styles were dominated by "Probing" then the "Interpretative" style. Student 1's conversations were concerned with gaining and clarifying information required to draft the design. In the last few

days, Student 1 negotiated new construction experiences. The theory that students participating in new experiences results in an even distribution of responding styles was not supported by the results of Student 1. The high levels of "Yes" at this late stage, suggests that Student 1 assumed more of an assistant role.

Day 13: End of Construction phase

At the end of the construction phase, the "organise" category became the main element of conversation. This reflected the final process of installation. "Buildability" issues remained significant. The other categories, "Form/Qualities" and "Constraints" engaged less interest, particularly "Constraints" as these details had been resolved earlier to gain client approval.

Conclusions

Content

Overall, "Buildability" and "Form/Qualities" issues were discussed each day at varying levels. This demonstrated that design and detailing were concurrent processes. It also highlighted that the teaching strategies to promote detail resolution as the design driver had succeeded. "Buildability" and "Form/Qualities" prevailed during the design phase. Issues of "Buildability" grew in importance at the end of the design phase, with the requirements to build a 1:10 model to gain Council and client approval. Throughout the construction phase, "Buildability" issues maintained a dominant position, only to be surpassed by "Organise" in the last two days. "Constraints" was the least discussed category and recorded low responses even through the design phase. This factor may have contributed to a few problems that arose before installation. The other contributing factors were, time constraints, number of participants and the period required to develop familiarity and trust between group members.

Interpersonal Responding Style

In general, there were two distinct trends, which seem to relate to the design and construction phases. For most of the design phase, (Day 1-4) the students relied on

one or two styles. The "Evaluative" style was common to each student, indicating design discussions were influenced heavily by personal opinions. Once construction began, students' responding styles showed a trend to be more evenly distributed. As suggested earlier, this is thought to be an indicator of learning, as these experiences were new to the students' and challenged their existing framework of knowledge. All students responded with a greater number of "Yes", than in the design phase. This occurrence was attributed to many factors, such as the act of making, industrial noise, ear protection being worn, limited experience and fatigue.

Group work

The variances in student experiences, particularly in the design phase may also relate to the different roles adopted within the group. This supposition is supported by the observed responses that there was some contention for a dominant leadership role between the students studied, and also within their larger group.

As mentioned earlier Student 1 by the fourth day had assumed a supportive role. By drafting the approved design, Student 1 had been distanced from the group's detailing debates and decisions. This conscious decision to withdraw from the debates continued throughout the construction phase. Students 2 and 3 vigorously debated decisions and the collaborative design model up to the fifth day. On the sixth day, Student 3 was absent, reducing familiarity with the design processes explored. By unfortunate co-incidence Student 3 had less involvement at the end of the construction phase due to injury and early departure. The need for a dominant leadership role became an insignificant issue once the design was approved and construction commenced. Each student had limited experience in building and requested advice.

Despite the small sample, these findings suggest that these mature and confident students did discuss and consider design and detailing issues concurrently. Issues relating to the project's form, qualities and buildability were dominant. However with such a small sample it was impossible to draw more detailed conclusions about the content of conversations. When students were faced with new experiences there seemed to be a trend that interpersonal responding values were of similar value, indicating learning. This analysis has also shown the importance of recording group

interactions as it influenced students' experiences. Further studies are required to examine if these findings are indicative for other students.

Appendix 6.2: Observation Schedule for Study 2

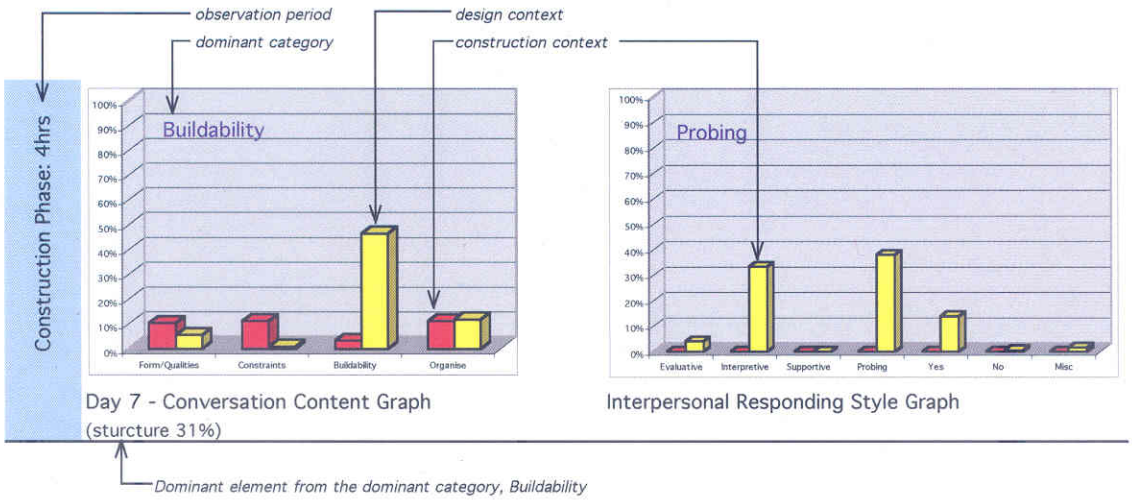
Day:
Date:
Status:

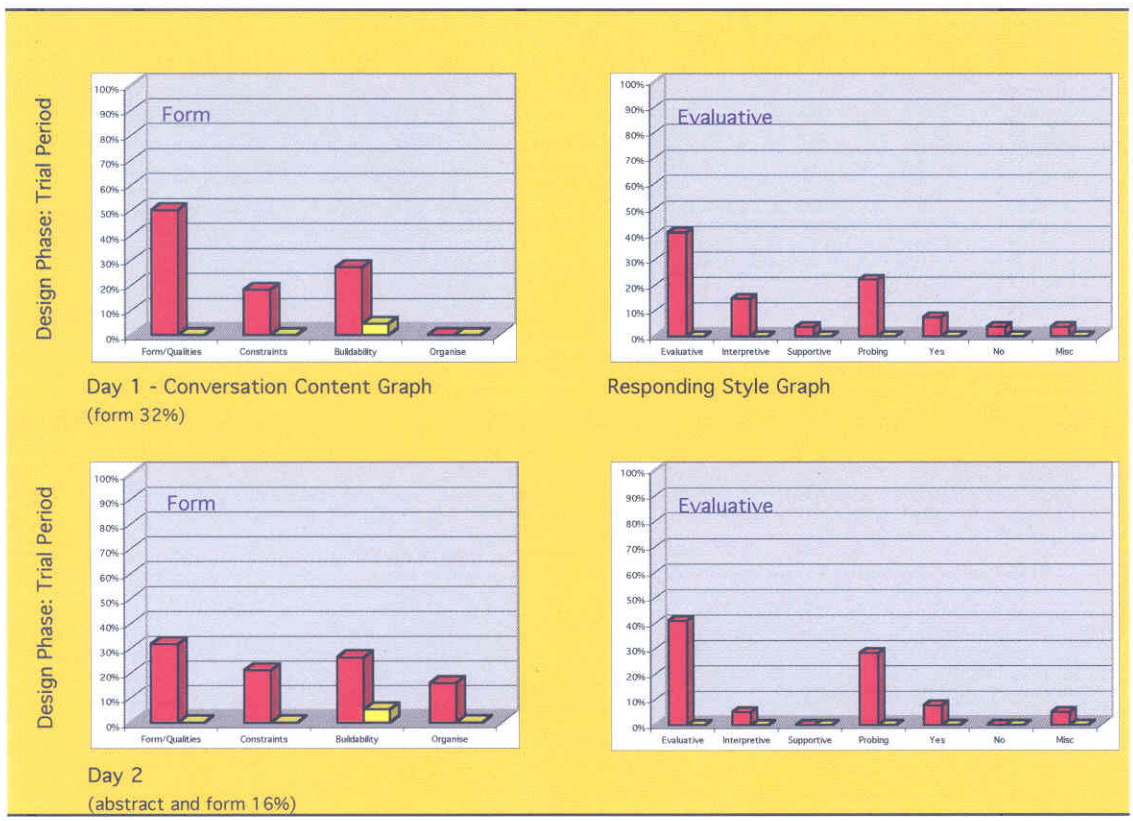
			Student 1		Student 2		Student 3	
			D	P	D	P	D	P
Content	Form/Qualities	Abstract/symbol/idea						
		Colour						
		Form						
		Size/Dimensions						
		Light						
		Texture						
		Sub-Total	0	0	0	0	0	0
	Constraints	Authorities/safety						
		Function/brief						
		Site						
		Sub-Total	0	0	0	0	0	0
	Buildability	Structure/Detail						
		Materials/Finishes						
		Set out						
		Tools						
		Sub-Total	0	0	0	0	0	0
	Organise	Inetgrartion/Co-ordination						
		Making						
		Time Management						
		Sub-Total	0	0	0	0	0	0
		Total	0	0	0	0	0	0
	Responding Style	Evaluative/judging						
		Interpretive/analysis						
		Supportive/assisting						
		Probing/ question						
		Yes						
		No						
		Misc						
		Sub-Total	0	0	0	0	0	0
	Other	Unrelated Conversation						

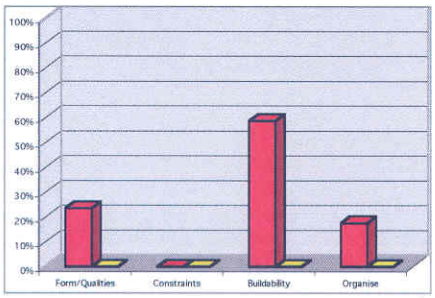
Appendix 6.3: Individual Observation Results of Participants in Study 2

Day analysis of Student 2's conversation during a "Learning by Making" studio

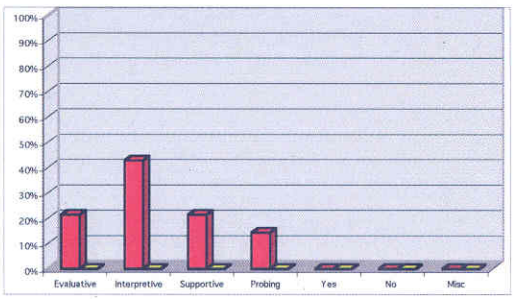
An example of how to read graphs



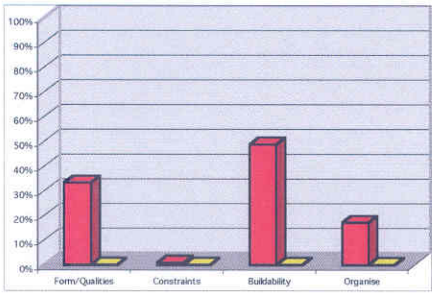




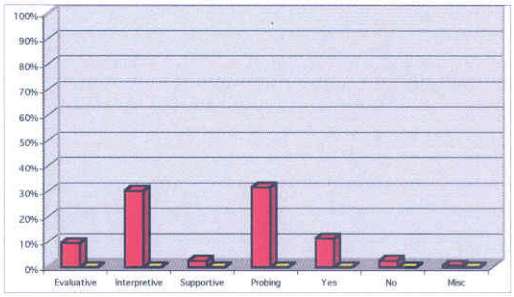
Day 5 - Conversation Content Graph

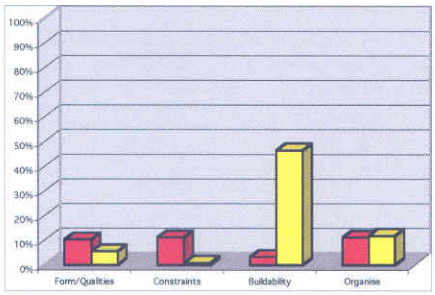


Responding Style Graph

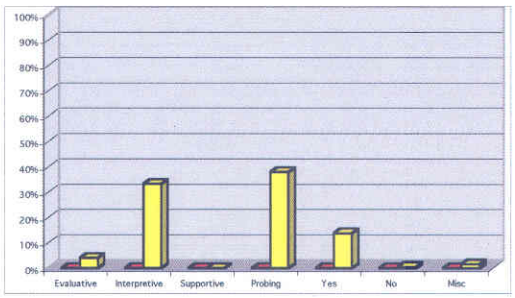


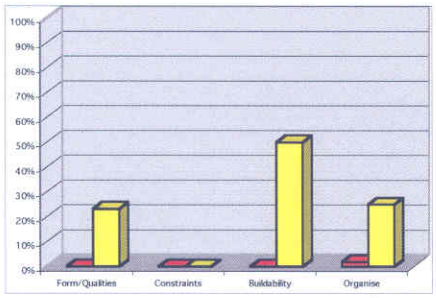
Day 6



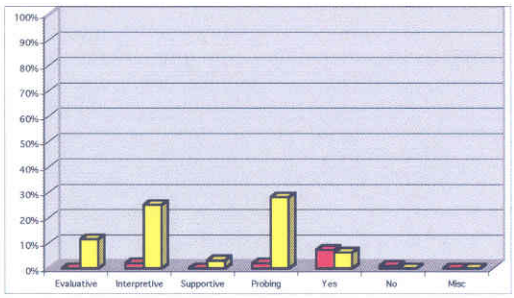


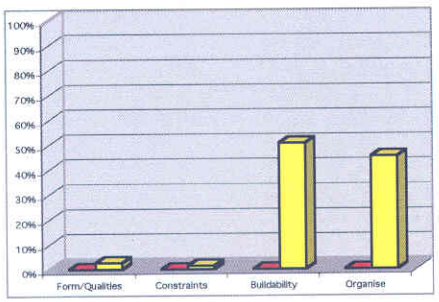
Day 7



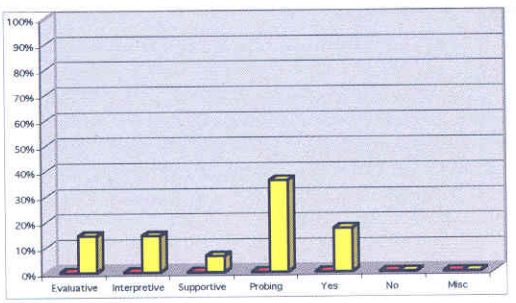


Day 8

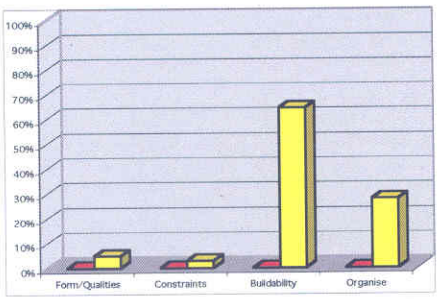




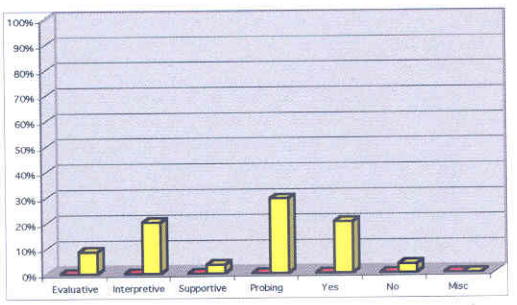
Day 9 - Conversation Content Graph

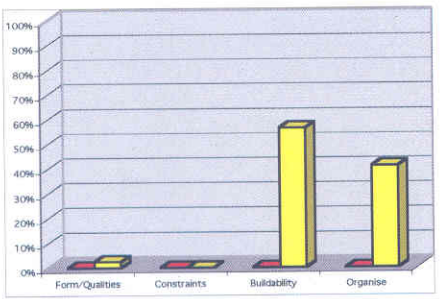


Responding Style Graph

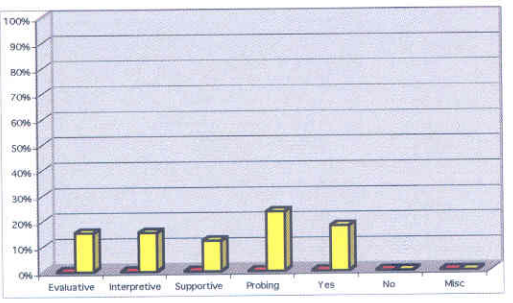


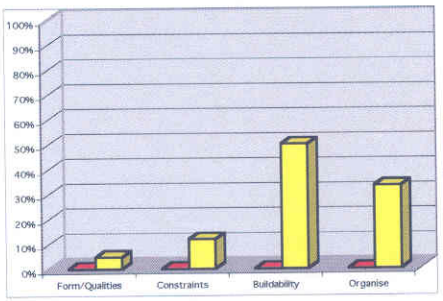
Day 10



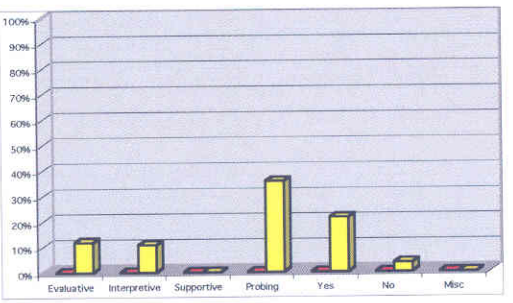


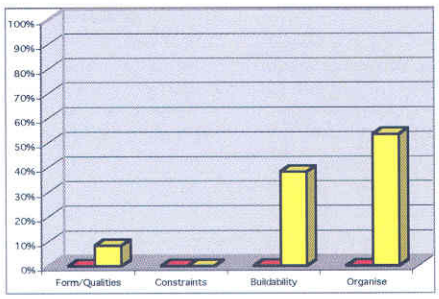
Day 11



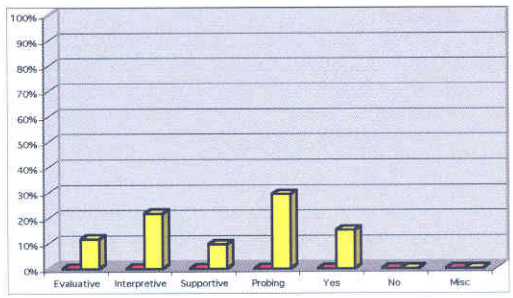


Day 12



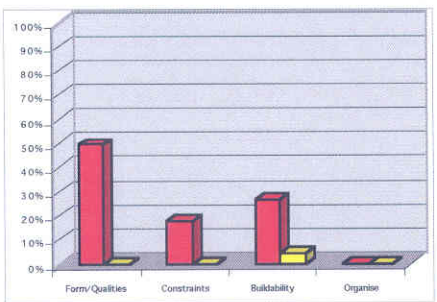


Day 13 - Conversation Content Graph

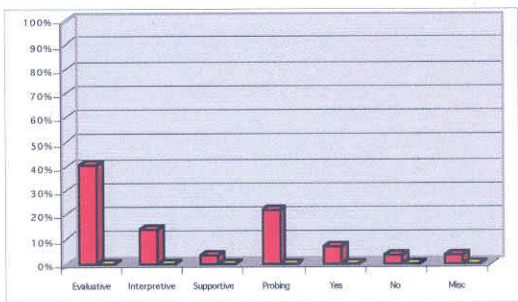


Responding Style Graph

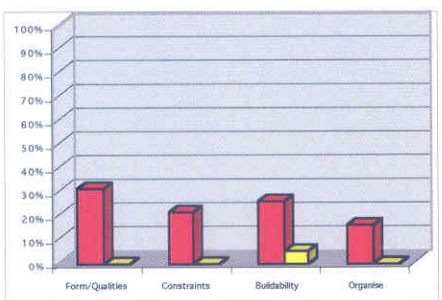
Student 2 results



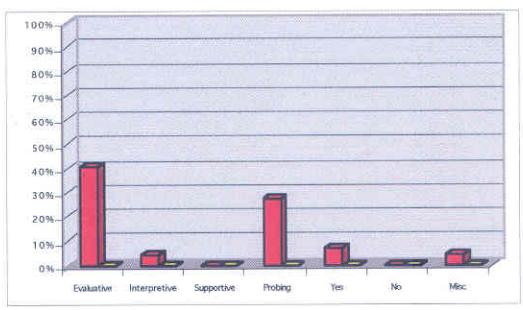
Day 1 - Conversation Content Graph

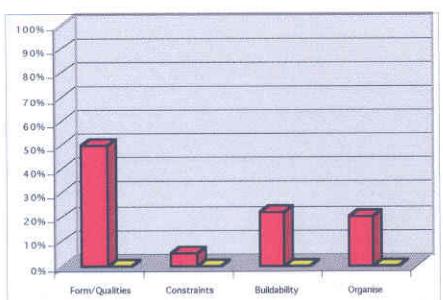


Responding Style Graph

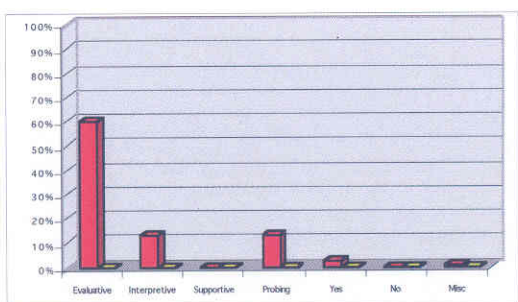


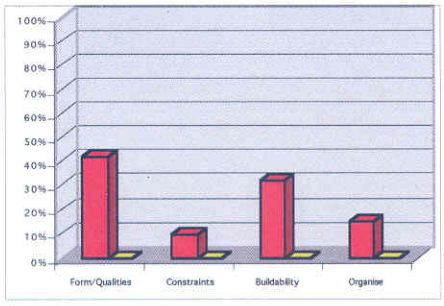
Day 2



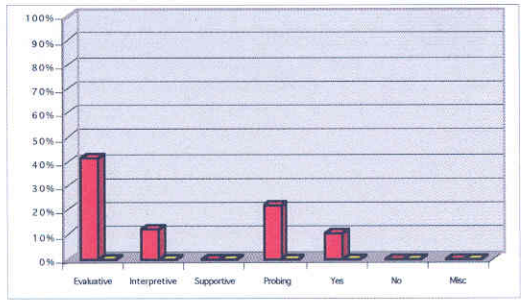


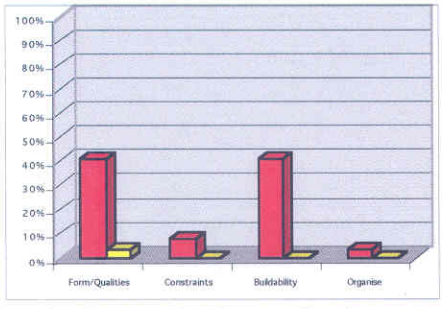
Day 3



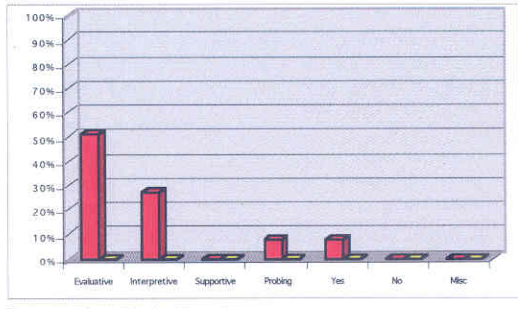


Day 4

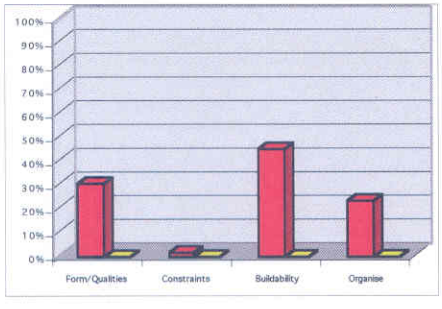




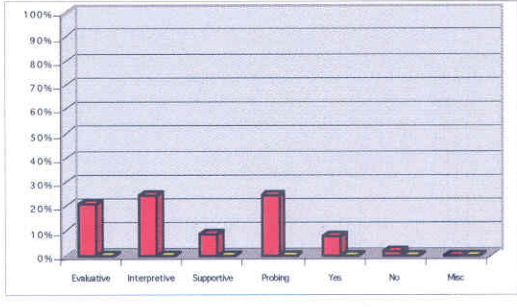
Day 5 - Conversation Content Graph

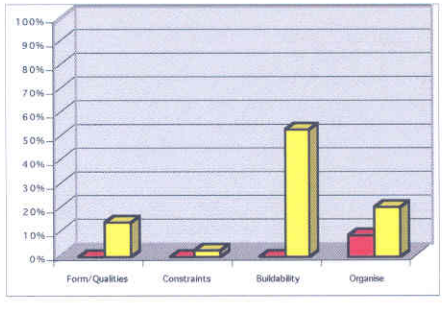


Responding Style Graph

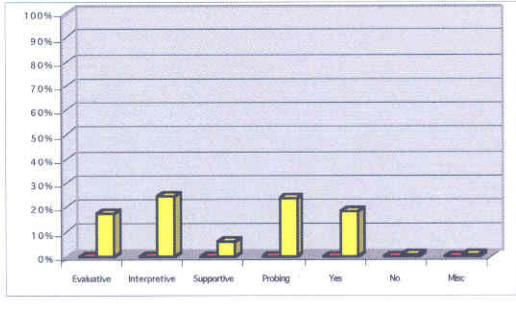


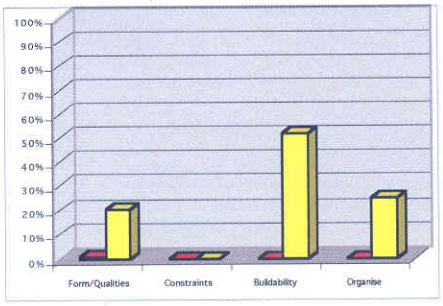
Day 6



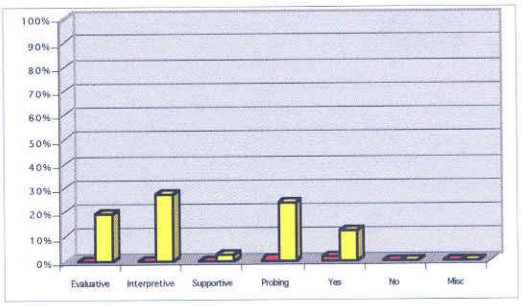


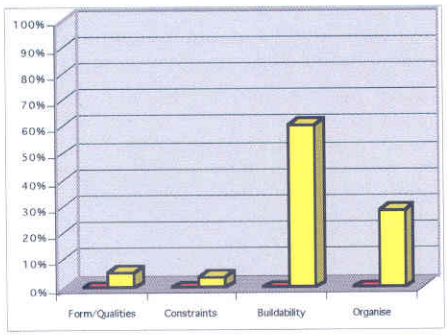
Day 7



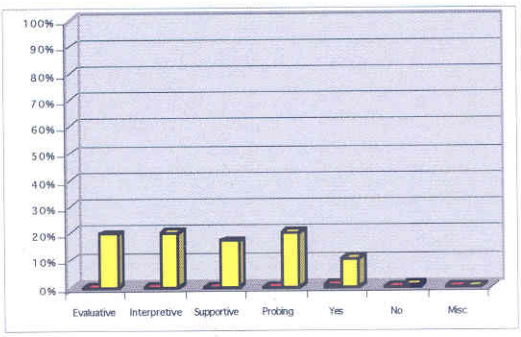


Day 8

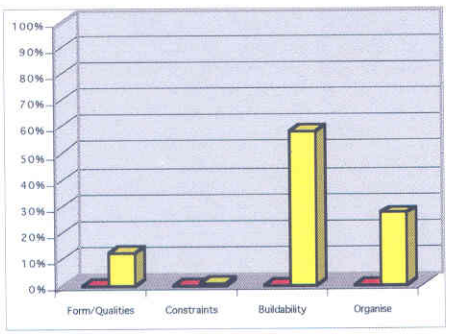




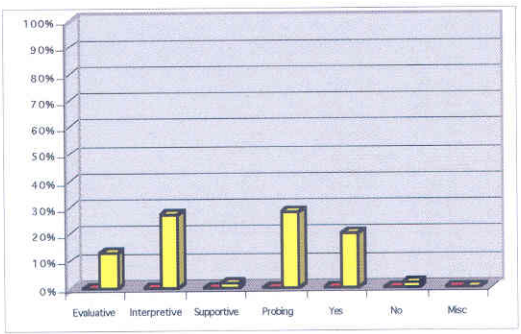
Day 9 - Conversation Content Graph

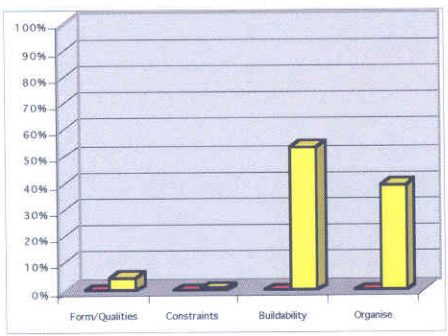


Responding Style Graph

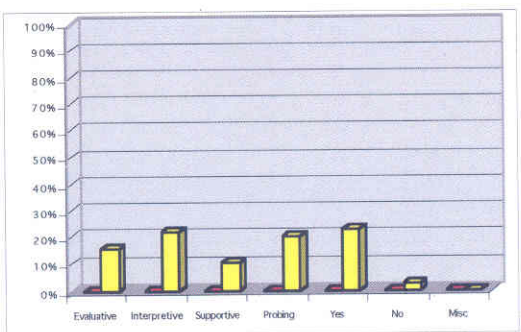


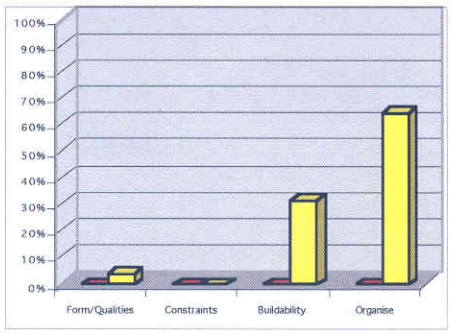
Day 10



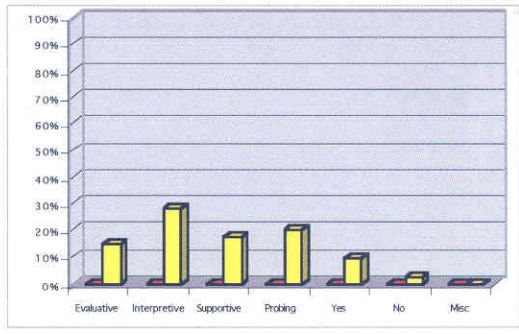


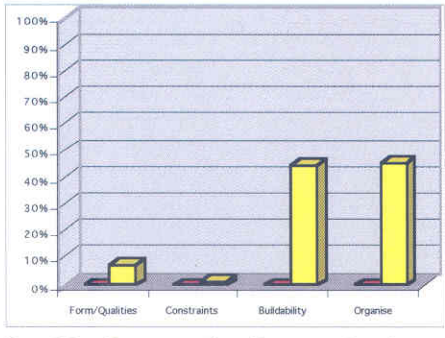
Day 11



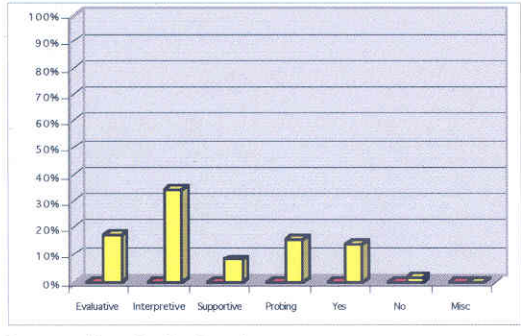


Day 12



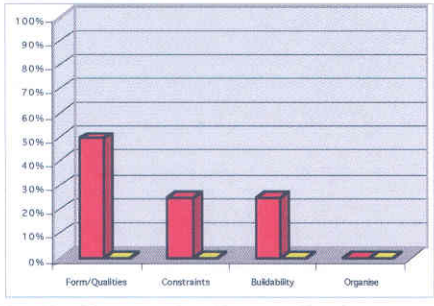


Day 13 - Conversation Content Graph

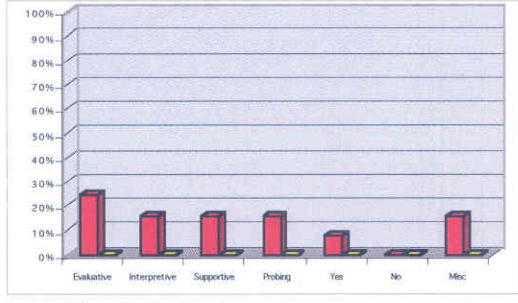


Responding Style Graph

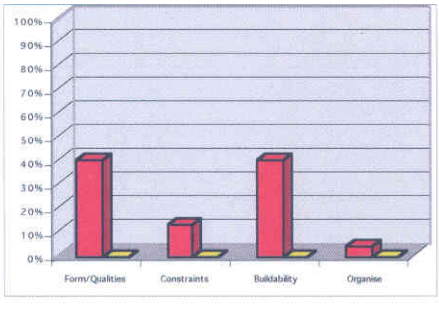
Student 3 results



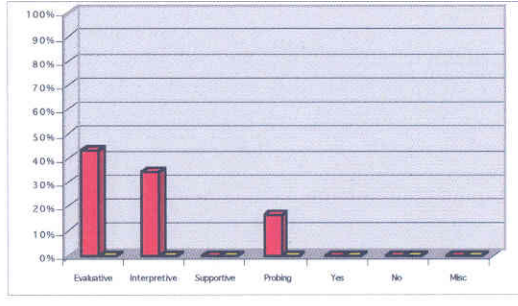
Day 1 - Conversation Content Graph

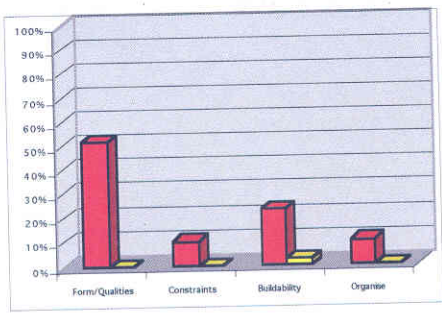


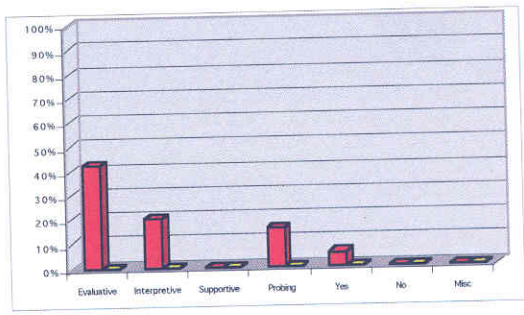
Responding Style Graph



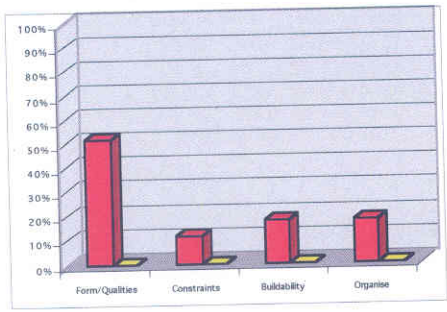
Day 2

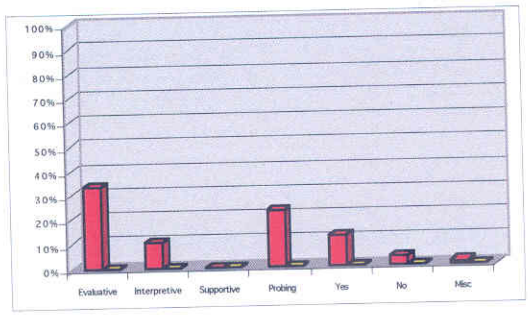






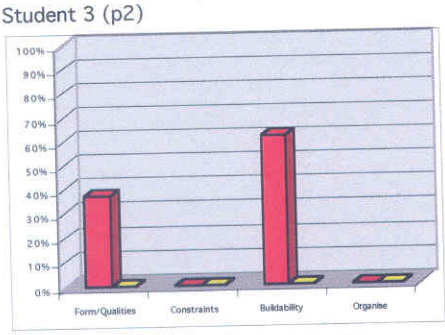
Day 3



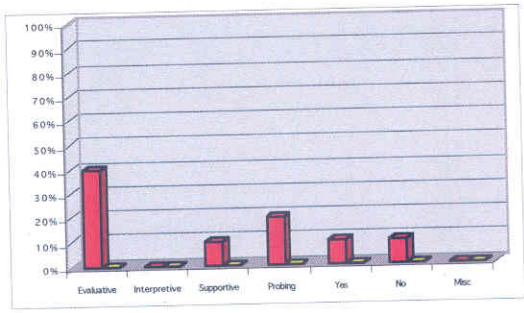


Day 4

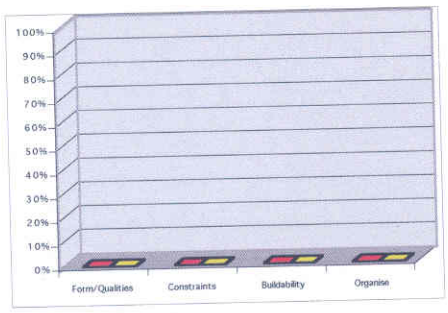
Student 3 (p2)



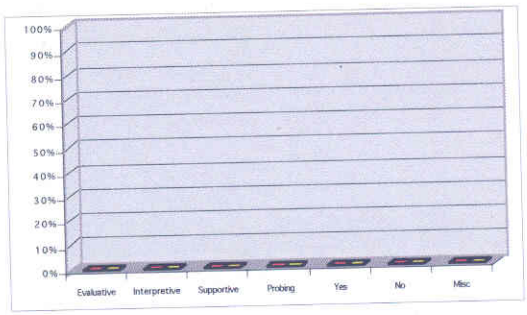
Day 5 - Conversation Content Graph

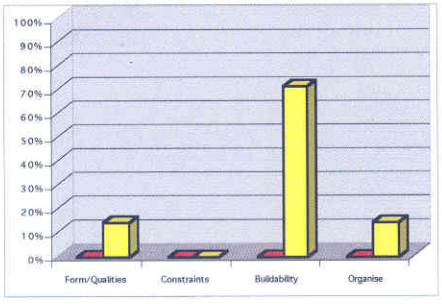


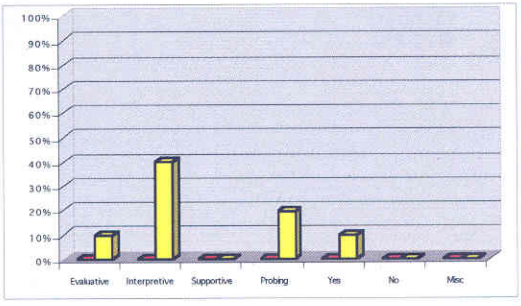
Responding Style Graph



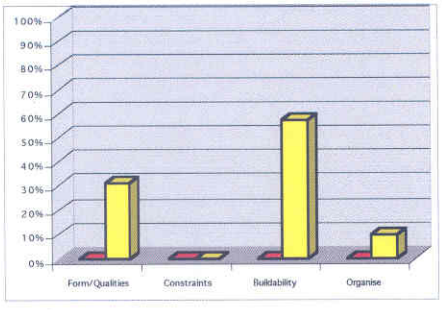
Day 6

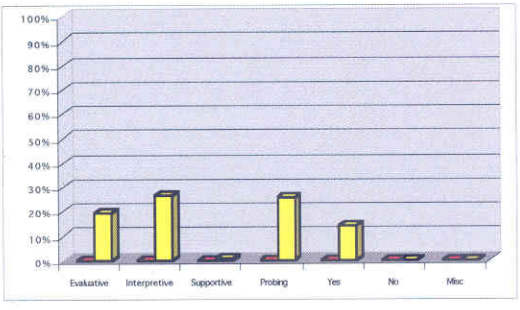




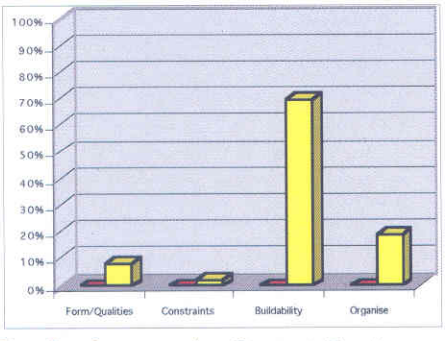


Day 7

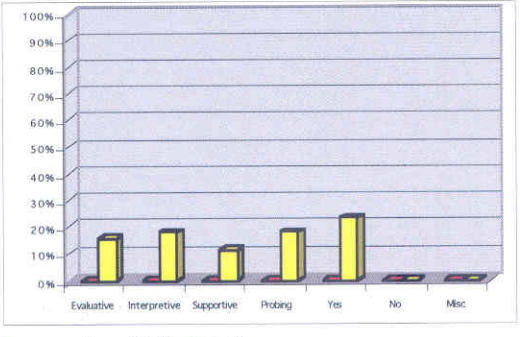




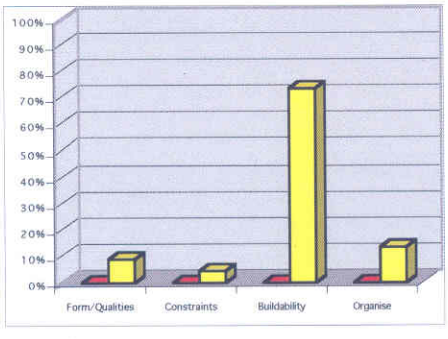
Day 8



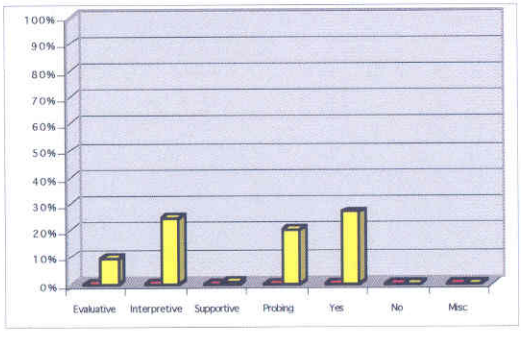
Day 9 - Conversation Content Graph

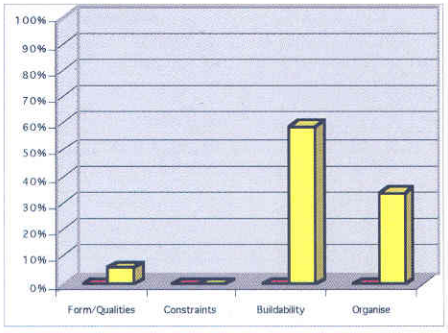


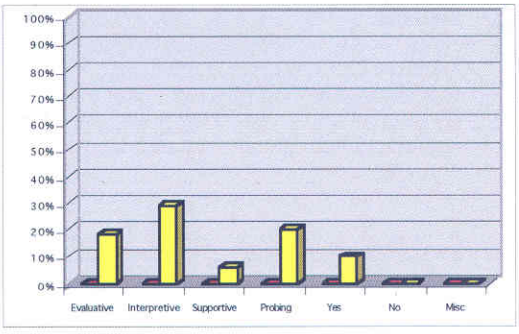
Responding Style Graph



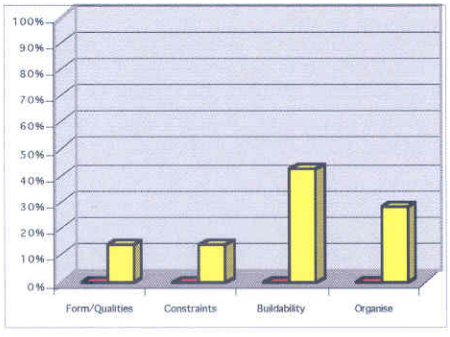
Day 10

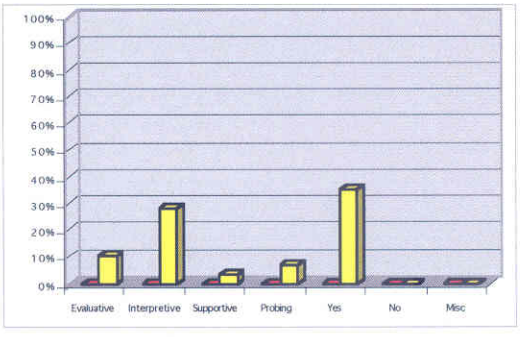




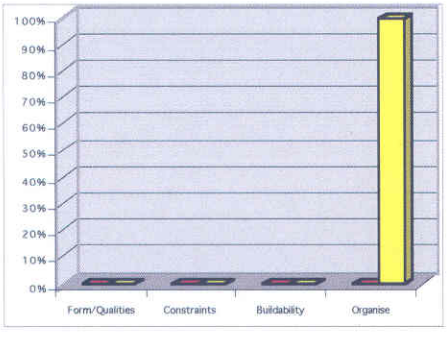


Day 11

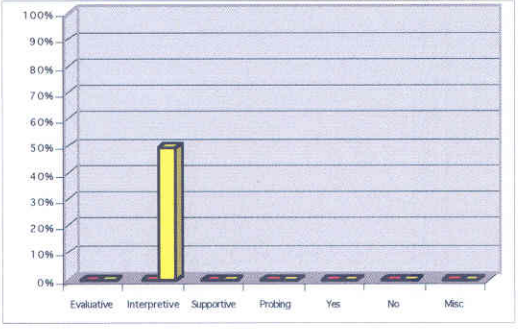




Day 12



Day 13 - Conversation Content Graph



Responding Style Graph

Q6 **Did you ever build, sew or make things?**

a)	Build (for example dog kennel or a shed)	59%
b)	Sew (for examples clothes, a kite, or sails)	54%
c)	Make things (for example models, or a billy cart)	85%
d)	Other, please specify:	16%

Q8 **Have you been involved in a complex building project, such as a house?**
In the terms of physically making.

a)	Yes	41%
b)	No	59%

Section 3: Personal Learning Experiences

Q9 **Please rank the priority of these learning experiences for you in this Design and Construction Project, from 1 to 9 on this sheet. (1 being the most important, through to 9 the least important)**

Learning Experiences	Rank
Development of Communication skills *(between team members, peers, clients & consultants)*	5
Re-informing the design process by exploring construction	2
Development and appreciation of team working skills *(design and construction)*	6
Realisation of a scale model to "actual" dimensions	9
Better awareness of the process of architecture *(design and making)*	1
Understand the capacity and structure of materials	3
Development of construction skills in the workshop	4
Research and explore different techniques to fix materials	7
Understand critical relationships in the formation of Architecture	8

Q10 **Please describe if there are any other important learning experiences that you expect to learn from this Design and Construction Project.**

Q11 **Which type of learning format do you think best represents what you respond to and gain most from?**

a)	Information is presented by lecture and notes and assessed by the application of knowledge in assignments.	5%
b)	Information is presented by lecture and notes and assessed by examinations.	0%
c)	Information is presented by lectures, group discussions and assessed by the analysis of work presented.	26%
d)	Guided self learning towards a set project	23%
e)	Base information is presented and students physically explore and experiment to gain further knowledge.	56%

30 of 40 students responded to part 2/2:

"LEARNING THROUGH MAKING" SURVEY PART2/2

All information collected will remain strictly confidential, student names will not be published.

Identification Code:

Section 1: This section relates to learning experiences and motivation that you gained from participating in the Design and Construction Project. If more than one response is appropriate, please circle each one.

Q1 **From your participation in this project did you gained or improved your knowledge from any of these learning experiences listed below:**

a)	Development of Communication skills	67%	1
b)	Re-informing the design process by exploring construction	63%	2
c)	Development and appreciation of team working skills	60%	3
d)	Realisation of a scale model to "actual" dimensions	67%	1
e)	Better awareness of the process of architecture	43%	4
f)	Understand the capacity and structure of materials	67%	1
g)	Development of construction skills in the workshop	67%	1
h)	Research and explore different techniques to fix materials	40%	5
i)	Understand critical relationships in the formation of Architecture	37%	6
j)	Any other learning experiences not mentioned. Please describe:		

- exploring team leadership
- learned not to be too precious about certain things
- confidence in your opinion being valid
- all of above
- understand the importance of footings as an integral part of the structure

Q2 **Were any of these learning experiences circled in the previous question unique to this type of studio that you believe it has benefited your architectural education?** *(Please circle the learning experiences that were unique and beneficial below.)*

f)	Development of Communication skills	20%	7
g)	Re-informing the design process by exploring construction	33%	5
h)	Development and appreciation of team working skills	37%	4
i)	Realisation of a scale model to "actual" dimensions	53%	1
j)	Better awareness of the process of architecture	33%	5
k)	Understand the capacity and structure of materials	47%	2
l)	Development of construction skills in the workshop	43%	3
m)	Research and explore different techniques to fix materials	27%	6
n)	Understand critical relationships in the formation of Architecture	10%	8
o)	Any other learning experiences not mentioned. Please describe:		

- exploring team leadership
- different design methods. ie not drawing just modelling

Q3 **Have your original learning expectations (before the project began) been met?**

a)	Yes	83%
b)	No. Please describe:	17%

- managed to do both stream 1 + 2
- exceeded (x2)
- expected more exploration of higher tech + innovative techniques
- had no real expectations they have been exceeded
- thought there would be more construction skills
- was hoping for more in depth knowledge into timber engineering aspects

- I expected a more intense teaching of the properties of wood + its applications throughout the world
- yes but not what I really expected

Q4 Do you think any of these learning experiences will assist you in future design work?

c)	No	0%
d)	Yes. Please describe:	100%

- ability to fast track the design process
- how deceptive + informative models are
- observing the effect of the group dynamic
- many heads do not make light work
- it will assist my future design work
- I feel better prepared to think through how things come together + limitations
- I think I will design with a more intimate consideration of materials
- model to 1:1 realisation
- construction principles + details
- especially team + communication
- models rather than drawing
- acquired - negotiation, team skills, timber properties, architectural logistics + sequences
- good pre-design = better results
- know what to expect when there are similar situations like this workshop and lead the workshop if possible
- team work + communication
- working in groups with inexperienced/ unfamiliar people to reach a common goal
- process of consideration + prefabrication
- better
- more informed design that is constructible
- putting things together in teams
- mostly the drawing/creative process
- the ardous task it is to create a product
- unique method of design by making
- design process
- awareness of materials
- group working
- I am going to have to change my design technique: I'll find it hard to work alone
- yes, team work is a matter of interpersonal relationships
- it made us think of the construction details as we design, getting a better idea of our design work
- being aware of critically understanding the space provided before proceeding with elaborate designs - therefore elimination + the result is achieved quicker

Q5 Do you think any of these learning experiences will assist you in further understanding building construction?

a)	No	7%
b)	Yes. Please describe:	93%

- junctions + bracing
- not as effective as its assistance to design
- I still don't know enough how to put together a building
- realisation of the real nature of creating a building, not just designing
- poor old subbies
- construction methodology
- understanding the complexity between 2d drawing + actual buildings
- I understand more the detailed steps in the building process
- greater appreciation of materials, details + construction
- just basic structure
- thinking about how something is put together as well as how it looks
- acquired - negotiation, team skills, timber properties, architectural logistics + sequences
- the nature of the materials + construction errors
- very basic understanding has been achieved
- connection of autonomous elements
- choice of materials joint
- more informed design that is constructible
- details + construction methods
- learning through making
- connections, especially timber types
- practical construction
- only on an empirical level: it's just information to use when designing. The design technique is much more important
- yes, team work is a matter of interpersonal relationships
- detailing and realising building construction
- actually building things - seeing how they go together

Q6 **Do you think that for the amount of time that you spent in the workshop that you gained a satisfactory level of learning experiences?**

a) Yes 80%
b) No. Please describe: 20%

- I am glad I got some theory
- need a team leader - or higher tutor interaction to maximise
- I found there were too many people in the workshop to sufficiently allow all to have a hands on experience and thus learn more

Q7 **Were you excited, satisfied or disappointed by the project outcome:**

a) Excited 67%
b) Satisfied. 37%
c) Disappointed 3%

Q8 **Do you think your emotional response to the project outcome affected your learning and motivation?**

c) Yes 83%
d) No. Please describe: 17%

- clear head, good work, sharp tools, sharp job
- ego always gets in the way
- unrelated - can have learning process regardless of emotion + also could be better if disappointed - learning by mistakes
- it is the motivation of learning
- absolutely
- the commitment was to ourselves not to an assessment body or even the council so much

Q9 **Do you think that the contribution made to the community through a building project adds to your learning and the outcome?**

a) Yes 97%
b) No. Please describe: 3%

- they got the bus stop + we got the experience
- greater experience in presenting to client + critically judging the project in terms of community expectations
- no but was a great opportunity
- Yes, the need to act responsibly tempers all actions, driving us to "mature" decisions

Q10 **Given the opportunity, would you feel more confident and motivated to undertake another building project at this School or elsewhere?**

e) Yes 97%
f) No. Please describe: 0%
No comments

Q11 **Do you have any other suggestions to improve the types of learning experiences?**

- integrate other building materials - concrete/ masonry
- smaller groups
- too good
- too many people to maximise each persons learning experience
- more about accessibility + cost for mainland students
- encourage new students embedding procedures before being inundated in the world of paper
- groups a little too large
- if the building is completed, in place and in use would be more satisfying
- improve the structuring of the groups - ie roof, wall, seat, structure as they are so integral to each other, problems with design, construction and sequencing
- not everyone involved at the end of the process
- larger scale projects

- more of the lecture series as well as the workshop time to increase knowledge of products etc.
- format works well - model sketching + large scales
- a lot of people felt that there was too many people for one small project - thus didn't get into the project as much as we could
- the communication of each other needs to be improved, many misunderstandings
- eat as we work
- I think the design process was marred by dominant group members to a degree. Ways of eliminating this would be interesting: the divide between respect for someone's decision + the need to produce a high quality product

Q12 Free space, to provide any worthy comments!

- like the two groups could see different solutions
- Appreciate lecturers open-ness +generosity
- fantastic see you next time
- at the start should be a discussion on how the group should run ie non-hierarchical, how to deal with passive, and aggressive
- should be regular meetings to encourage each persons contribution
- excellent course + rare opportunity for this sort of work
- well worth expenses + time + effort
- nil sine labore
- it was good
- rest time is not enough or re-arrange time management
- smaller groups will enable more contribution
- more beers

Appendix 6.5: Matrix of the Relationships Between Students, Lecturers and Researcher Involved in Study 2

	Student 1	Student 2	Student 3	Lecturer 1	Interviewer
Background	* worked in three architecture offices/ completed TAFE degree in drafting – going into 5th year at UTS	* worked in two architecture firms, in final year of study at Uni of Melbourne	* already holds another degree in fine arts, in 4th yr at UNSW	* experienced LBM lecturer	*researcher/ close in age and interests with students studied
Student 1 on:	*… I think that I took on more of an observer… I didn't really connect with any of those other people, … it would have provoked me to step back and see what everybody is about…*	*Ralph and I spent a lot of time together. … at one point it got a little frustrating because I was doing the drawing and he kept telling me what to do. …, I think that he was frustrated because he had to sit there and watch.*	*I didn't necessarily agree with most of her views but, we just let it work through whatever we were doing…I did of voice my opinion but I didn't want to argue with her much.*	*I do not think I spent a lot of time speaking to her directly … it was kind of an open discussion about certain problems that we were working on… she'd often guide me…*	*The fact that I'm not aware of being apprehensive in the first place may be an indicator…*
Student 2 on:	Held mutual respect for Sonya and Mick as they were organised, skilled and of similar age and consequently believes that they all got along well.	*I tend to take on an organizational role… it is a part of my nature… But where I have been in teams where there has been a very strong leader or where someone has a very good grasp on organizing things then I quite happy to sit back and let that person do it.*	Same as Michael	Less formal then the usual student/ lecturer relationship *I tried to keep most of them [discussions] within the group… particularly the decision-making, …* [because he regarded the lecturers as]… *facilitators rather than directors.*	*…you were just always there… to begin with you think I'll have to be careful with what I was saying and then, after a while you were just always there, so you, just became part, of the day, as far as what you were writing and typing. And it was also useful because I use to use you as a sounding board for some of my opinions.*
Lecturer 1 on:	*far more ready to accept the process…trust in the process and…not necessarily seeing architecture as a single idea.*	*Highly motivated, and had very high expectations of the program. He struggled with the idea that design could be achieved through many minds, and saw design as more of an individual process. But he really wanted to try, and I think he got over that hurdle about halfway through the process. Initially he started trying to design the whole building … because he said 'architecture's holistic', so to be able to accept architecture as a series of components and trust in the process took him a while."*	*Sonya was a little bit more like Ralph, but towards the end she particularly got really excited about a small component – the gutters that she was working on*		*… you were very unobtrusive in the program, as someone collecting information from the students.*

Appendix 6.6: Other Relevant Quotes Associated with the Link Between Design and Construction

Student 1 explains further with a comparison of his general experience at university:

> *...to design the whole thing and then just build a model...[Whereas in LBM]... we were still working on the design of things and elements as we were building the larger scale models and the smaller ones. So, there was considerable amount of input from both points, which is something I hadn't done or experienced before* (Student 1).

Student 1 commented that consideration between design and detailing, "can help make decisions when there are number of ways to do things."

Student 2 also agreed that his LBM experience had encouraged design and detailing to be considered together with a "Yes" response and did not choose to expand on this issue with further questioning. Unfortunately, this was the last question recorded in the final interview.

Appendix 6.7: Other Relevant Quotes Associated with the Application of LBM Experiences into Other Work

Student 1's response:

> *I think that what we did in ... [the LBM studio] has not had an effect on the way that I look at design process, but I haven't done anything that I could relate directly to it since. ...so if it came to doing something more like a little extension to a house or something closer to the scale, ... I think that would have a direct effect on me...* (Student 1)

As Student 1 discussed his response, he realised that LBM experience has influenced his awareness of realising a design proposal.

> *it has influenced me ... what it actually takes to get that result, and also the differences between an idea that you might have about something and then trying to make it happen. But, I don't know, the obvious problem with things ...[but I understand it is] a lot more complicated than it appears when you're first putting those ideas down ... [these types of experiences] bring home the reality of the difference between conceptual design and the reality of building something.*
>
> The LBM studio *"...made me aware of the fact that there are significantly different ways of approaching the whole design process..."* (Student 1)

For Student 2, the LBM experience:

> *reinforced that architecture for me is about building. ...therefore when I go into practice and I do get the chance to do more building, I will be using a lot more techniques and ideas that were talked about in [LBM studio], whereas at University, ...design work is resolved at scales of ...1:500, 1:200. I don't think the level of detail required will necessarily change the way that I think about it, because we're not looking at the way roofs meet walls, no connection details, and all those waterproofing issues." Also "the materials [used in LBM studio] were mainly timber, and a lot of the buildings that we were designing is more concrete construction... I think the actual process that I learnt down there will be taken with me, certainly when I start building, ...* (Student 2)

Like Student 1, Student 2 realises more connections or applications of LBM experience whilst responding.

> *I think, in the attitude that small-scale and detailed design influences your major conceptual design on the entire form etc, is very important, ... you need to be thinking about the finished product from back-front as well as front-back, ... is always carried through with my designs, and what I learnt in [the LBM studio] just highlights that, and heightens it* (Student 2).

Student 1 concludes, "...every bit of built work you do early on helps your confidence..." particularly when entering an office as a graduate architect.

Appendix 6.8: Other Relevant Quotes Associated with the Impact of Teamwork

Despite Student 1 concerns of participating actively within his group, the most memorable experience is associated with teamwork.

> *I think most memorable part of the whole workshop was the night that we were assembling the shelters ... when we braced and winched everything up and put it together, and there was an entire team of people [who] were all-of-a-sudden focused together on the shelter, ... - it was almost like a pit crew, you know - screwing the shelter bits together... all of sudden the teamwork was so evident, in the whole thing, I thought it was quite magic. It was a bit of adrenalin rush at the time* (Student 1).

Student 2 relates how their sub group, which included students 1 and 3, interacted with the rest of their team.

> *Like all group projects there were factions, and at the beginning whilst we were all working on individual components it wasn't such an issue. Towards the end when certain things had to come together and products had to be created, those factions became more noticeable. And I think again that the dominating personalities of student 3, student 1 and myself overflowed the other groups...[this was] ...received with a mixed response* (Student 2).

Lecturer 1 recalled that many older students find it difficult the transition to a collaborative design process, however this component is important to LBM because;

> *we were very conscious, we didn't want to do a design competition style ... where one scheme gets selected and then everyone builds the scheme. ...Because then, everyone's ideas aren't tested, ...I know that everyone's initial idea isn't realised in the final building, but that's very similar to a process of architecture anyway: ideas reshape as you progress through the design stages. An initial idea may not be the final thing that's actually built* ...(Lecturer 1)

Appendix 6.9 Transcribed Interviews with Student 1

First interview with Student 1
Time duration: 1 hour

Interviewer	This interview, is to let me get a bit more of an idea about the context of how you've become an architect and why, and all those sort of reasons, to get a better understanding of,
Student 1	What sort of person I am.
Interviewer	Yeah, and your previous experiences. What makes you who you are? So the first question
Student 1	Can you get that all in thirty minutes!
Interviewer	Yes!
Student 1	(Laughing!) That's pretty good.
Interviewer	Your Brilliant, so the first question was, how did you come to study architecture?
Student 1	Um, yeah, it started probably when I was quite little. Um, for some reason, um, I mean kids always like to draw and play with blocks and yeah that was no different for me. But I kind of, have never stopped. And, as I got older I loved the drawing and playing with blocks and lego more and more. And I always said that I wanted to do, wanted to be an architect, but I didn't actually know what that meant. Um, so that's when it sort of started, it would have been even before I started high school, that I got interested in all that stuff. Um, when I left high school, um, I didn't have, um, enough marks to go and do architecture.
Interviewer	Yes
Student 1	So, um I went along to whole heap of institutes and TAFE colleges to do drafting. And I got into one of those and then a few years later I qualified to get into University to do Architecture. So that is how – that's the short version of how I got into Uni. Um, and, then I didn't really know what architecture was about, even after doing two years of drafting. But within about, 3 months of being at uni, I started to know what architecture was about and I didn't know to that point. Does make any sense?
Interviewer	Yes.
Student 1	Yes, Yes, that is how I got into doing architecture. The sort thing, the whole bit about what architecture is about I got at uni. I actually didn't do much research about it before then. I just thought that is what I wanted to do and I once I got there I knew that was what I wanted. There is, actually one other thing that I did at, um, at high school we did an aptitude test.
Interviewer	Okay, was this is in Australia?
Student 1	Yes, that's right. Um, we did an aptitude test, I think at the end of Year 11. Um, but I don't know how these things work, but you know, they basically asked us a whole series of different questions, um which seem to be all over the place. And then they sent us a report back, and which sorted and put you in different categories. And sort of tabled the primary thing that you would be good at and the secondary, then the third and the fourth, there were four categories. Um, and doing, being involved with Art and people, and whole, all those social movements were number one. And then science, technology and all that were number two. So those two things together sort of said to me well, that I want to do architecture and I know that it involves those anyway so it should be okay. So I kind a - it was more a confirmation to me and that I wasn't making a huge mistake by going in that direction.
Interviewer	Did you have any contact with architects like,
Student 1	Before I going to Uni?
Interviewer	Um, yes and when you were a kid and you enjoyed doing things like that. Had you, what was your contacts been with architects. Or was it just through TV or?
Student 1	As far as I know, um, I didn't actually have any contact with anyone from the profession. But, when I was in high school, my parents had, some contact with an architect and a landscape architect when they were building their house. And I was still quite young at the time and all they, the only contact that I got out of that was , they said if you want to become an architect you have to play with lego all the time but I had that down pat, that's alright. That is about it. I don't know actually, unless

	there was somebody when I was really young but that hasn't really had any influence. Um, I didn't, you know the social connections that were involved with my family didn't, never really became established in Australia. We came to Australia as immigrants and you know, my father - parents sort of found it hard to speak English and um, obviously you know you kind of had to do everything for yourself.
Interviewer	Yes
Student 1	And you didn't have all those friends and family friends that you would have if you were in your own country.
Interviewer	Yes
Student 1	Yes, so I didn't really have any connections, I guess that answers your question, I guess. I didn't till I went to uni.
Interviewer	So, it interests me, that even though you didn't have the marks after high school that you were still interested at doing what ever you could do, perhaps that was close to architecture, and building on to that, to perhaps become an architect one day, is that right?
Student 1	Yes that's right. I kind of thought that, um I guess there was a whole bunch of different issues that related, ...that related to me not getting high enough marks. Um,... um, ... and, I kind of made it a mission to prove to myself that I could still become whatever I wanted, regardless of what the HSC said what I could or couldn't do. Because my mark wasn't just short of coming, it wasn't even in the same field, type of thing. Um, so I said to myself, I know that I want to do this type of thing and I know that I am capable of doing this, so I went for it, I guess.
Interviewer	You didn't have any other, any other dreams or doubts about bits and thought about some else at the same time or?
Student 1	Um, I didn't have any doubts, the only thing that I considered at the time and even sort of during my TAFE course and the first few years at uni was to get much more heavily involved with computers. And, um, ... that sort of thing, because actually, ... it was interesting because I had always found computers very easy to deal with and I had spent a lot of time, um doing things with my own computers and that sort of thing and I had some friends, a lot more friends in connection in the computer industry and I didn't know anyone in the architecture industry. And in the back of my mind I thought that would be something that I would get involved in but, um at the end of the day, once I started studying architecture, I knew that I really wanted to do that more than anything.
Interviewer	Yes
Student 1	Um, but that would have only been the other thing that I would have considered at the time. But actually, every day that goes by I actually don't regret that decision.
Interviewer	That's marvelous!
Student 1	Especially in light of what's happening in the IT industry at the moment. (Laughing) It is making me very happy!
Interviewer	(Laughing)
Student 1	I don't really feel that way. (Laughing)
Interviewer	So was it, was architecture, um what would you say a lifestyle choice, like you thought it would be a fun job or reliable job or?
Student 1	Um, ... going, ... it is an interesting question because I don't know if I had even considered all those things. I thought that was what I wanted to do and I enjoyed, first of all I enjoyed the drawing, the actual manual drawing and drafting part, um and to be honest even after finishing TAFE, doing drafting for two years. I had absolutely no idea about what architecture was really about. I mean thought I knew, before I knew I was doing two years of that before I got to uni, it sort of changed dramatically. Um, but in terms of what I thought it would do for me, what it, I never considered it, I just considered that I thought that it would be something that I would like doing and I would be good at. Um, and I thought... A lot of people had told me while I was going through school, they'd advised me on the fact that architects don't really make much money or that it's really subject to the economics or whatever situation there is at that time, in the mid to late eighties , so it was like, pretty bad anyway, like the late eighties, early nineties. So there was no work for architects anyway or it wasn't worth pursuing unless there was some work around. Um, but I didn't, I never considered what type of lifestyle it would give me or wouldn't give me. Um, I just thought, that is what I want to do. It will support me in anyway. I'd make the best of it? How's that?
Interviewer	That's good

Student 1	That is as far as I can recollect, I guess.
Interviewer	Um, different question. How did it, how did you come to attend the Australian Timber Workshop, the building workshop down here?
Student 1	Um, primarily because, um two years, the workshop that ran two years before actually some of my friends went to and I was actually going to go to that one but I had already planned a trip all over Australia. So I didn't cancel my trip. So when it came around again I put my name down, because when I came back they told me it was amazing and there was a lot of good feedback and it sounded like a really good thing to do. And, um, lot of hands-on, um, experience. So that is what got me interested and then I just didn't hesitate about it, I just went for it.
Interviewer	So would you say that you and your friends have a, um, in some way that you have a similar attitude to architecture that you, um, you what to get more, um architectural experiences just beyond, what you get taught perhaps at university?
Student 1	Um, yes, definitely, definitely, all those people that had attended the course and some others would, definitely said that was the case. Um, and, the nature of the course that we go to, which you would understand, makes it quite difficult, so, because you are working and studying at the same time, there is not much time to do anything else. So something like this was a really good opportunity to get out and do things,
Interviewer	So you felt like, um, perhaps you could immerse yourself in it and be indulgent.
Student 1	Yes, yes. It was something you, it was something that you couldn't afford to do in the studies and the lifestyle that we, that I am running in at the moment, going through my degree. It is not something that I could engage in even if I wanted to. Um, but then going away for it, it meant that I could forget everything and could actually really enjoy this, at least this part of it, which was really good.
Interviewer	Is the fact that, um this event was a holiday excursion to an island had any secondary benefits to that decision or, um ?
Student 1	Secondary benefit, um, ... It was good because I had never been to Tasmania before and I had contemplated going down there before, on my trip around Australia but I couldn't afford to get over the water. (Laughing) Um, that is as far as I was traveling all over the place.
Interviewer	So it wouldn't of matter, where it was?
Student 1	Um, it wouldn't of matter. And I think that the thing that sort of intrigued me more was the fact that it was in Tasmania or an island location that I hadn't been to before. But the fact that there were going to be architecture students from all around Australia at that place and that made me more interested, than the actual physical location.
Interviewer	So, that is fair enough. So do you think that comes out, perhaps your, um, social desires from being at [your university]?
Student 1	Social desires, do you mean the lacking (Laughing) social occasions that we have at our university?
Interviewer	Well, I am not trying to put words into your mouth but I think I have heard you say something similar before.
Student 1	Yes, probably. Kind of um, ... our university lacks the campus atmosphere and yes, certainly the, um timber workshop provided that, quite, well, um acceptably in comparison to what we normally get. That was really good and I quite like that and I would have love to been at university that had a proper campus atmosphere, but I can't afford to do it that way. But that isn't my choice, to be quite honest I think, um, something, looking back at it.
Interviewer	Before this workshop, before you came down here, can you recall any other memorable design and make experiences that you have been involved in?
Student 1	Um,...oh, not really, other than, other than, sort of small things that we did at our house, that my parents were building. We, um did some little bits and pieces things, um not actually with the house, but with the landscaping we did a lot of things together as a family. After that, we had actually never done anything like that before, design and make something, beside playing with Lego. (Laughing) That was probably it! Um, they were, that, um, that was the only thing I mean making my own toys, I don't know whether that counts, but I use to do things like that. Like with, um, when I was little I used to make my own (?) (something else was described softly that I cannot make out) At uni I definitely didn't get any experiences like that.
Interviewer	Okay, now with the workplace that you work in,
Student 1	Yes
Interviewer	Have you worked there all the time while you've been studying architecture at

	university?
Student 1	No, I have only been, I only worked, this is, um, almost exactly a year that I, um, I have worked at a couple of other offices, during the time that I have been at uni.
Interviewer	So can, can you sort of recall, like have they all been similar types of offices or different types?
Student 1	No, um ...I've, altogether, um, I have worked at, um, 1,2,3,4 different offices including the one that I am in and one office I worked at twice. Um, they have all been, I would say significantly different. Like, the kind, um, methodology and ideology behind the work they produce and, um, also their approach that they develop the company and their design approach is different as well. Um, like one of them was like an interior design commercial fit-out company, so that was quite different as well.
Interviewer	So, um, what sort of reasons, um have you changed jobs in this timeframe?
Student 1	Okay, um, one of the, ... the first time that I changed jobs because of, I, I, the first job that I actually worked at was at the interiors place and I had to work in an architects office anyway so that was the first time that I changed. I then stayed at that place for a while, Then I changed because I mucked about two and half, three years there and I no longer agreed with the way that the office ran but also their approach to designing buildings and the actual result at the end. Um, so basically I wasn't happy anymore, and I decided to move on. And then I did some contracting for a while, at couple of other places and I didn't like that. And the office that I am working at the moment, mm, I got because of one my tutors, it is actually the office of one of my tutors from fourth year and, um, she offered me the job while I was at uni. Offered to me to come in for an interview and I really like it, and it, ... like things that I have been told and taught at university and in practice. And It is very, ... it is different to all the other places I have been at so far.
Interviewer	How do you find that, how do you find that you personally deal ...
	Tape recording ended, realised this shortly after. New tap inserted.
Interviewer	Now where it cut out, fortunately, was you were explaining to me about, how your boss
Student 1	Hmm,
Interviewer	Who is very good at conceptualising design
Student 1	Yes
Interviewer	but how the management or the team structure is very much flat and that you talk to each other about these things (ie design work) even though she may have some better designing skills than you, that the responsibilities are shared and discussions work flatly across the office
Student 1	Yes
Interviewer	In that sense.
Student 1	And did you get all of that or do I have to say that again?
Interviewer	Well, obviously you did. What I just said was that an accurate reflection of what you were trying to explain to me?
Student 1	No, that's correct.
Interviewer	That's correct, okay.
Student 1	I think I could. I am just wondering whether I could add anything to it or not? Are you recording already?
Interviewer	Yes
Student 1	Okay, um, one of the things that, mmm, one of the things that, for instance that I've made a big difference in, since I started working there is, um, I guess my knowledge about computers, but in some ways we have been able to use it a lot more for designing where all the other offices that I have worked, were just purely using, you know, like for documenting or drawing.
Interviewer	So do you design in 3d?
Student 1	Aargh, yes, we do now. Since I started working at this office we have been using it a lot more. And we, for instance we have done, for, ... the biggest example of that is that we have been involved in designing a corporate center. And the process for designing that has been a joint one with drawing, drawing and modeling in three dimensions at the same time. So you know there would be some sketches given to me and I would interpret them and model something into three dimensions and then adjust them to what I think in three dimensions would suit better than the drawings were conveying. Then we would have to reprint those drawings out and work back over the 2d drawings. So, you know it was a to and fro process, one that we could

	constantly analysing in three-dimensional form and had to adjust the plans, elevations and sections. And that is something that hasn't been available to happen until I started to work in the office.
Interviewer	With that, in any of the offices that you were worked in did you ever have to make cardboard or foam models?
Student 1	Um, I didn't, we never made or we hardly ever made any models anywhere else. In this office we make models as well, cardboard models.
Interviewer	You do?
Student 1	Yes. Um,
Interviewer	What part of the design phase or, um, within the office is that used in?
Student 1	Argh, it is probably, it depends on the scale of the job, and, um, sometimes, um
Interviewer	Well what is its sort of purpose then if it's depending on scale?
Student 1	Well, okay, when I, when I say that it depends on the scale of the job, it depends on how much money is available to make more details and more presentation models later.
Interviewer	So is it only,
Student 1	For a cheaper job, we still do a massing model and stuff earlier on and we don't do any other models after that because, you know the job doesn't pay to do presentation models, unless council actually requires them. Um, but earlier on in the stage, there is some massing models that is part of the design process as well.
Interviewer	With every type of project that you do?
Student 1	Um, well most of the ones that we have done so far since I've been working there, yes that's right, that's what's happened.
Interviewer	So you do physical massing models?
Student 1	Yes
Interviewer	At what sort of scales?
Student 1	Um, well, the corporate center for instance, there were a number of models built before I actually staring working there, which were physical models. And they were, because it was a large urban project um, those models were only at 1:500. And, um, then while I was modeling on the computer, um, another model was also being built at 1:500, but that was relating to what we doing on computer and by drawing. Um, a couple of residential projects, like a block of units, a couple of models were built at 1:200, showing a number of different options. And there was a house, there was like a house renovation, extension that we built a very quick massing model, um, Kim actually built that one, in about an hour or something, which was like a 1:100 massing model for the client and actually for the council. For like a really early council meeting.
Interviewer	Did you ever make the physical models?
Student 1	Um, yes I have made, um, two or three. I don't have the chance to do that many.
Interviewer	Is that because you are required to be on the computer a bit more?
Student 1	Um, no, not necessarily, like, I have, I have, like I said its spread, so for instance since I have been working in this office there would have been um, six or seven different physical models built and probably roughly the same computer models built for similar projects or even the same one. And I would have been involved in building you know, two out of those cardboard models, there were three, um, and you know different people around the office were involved with the others. So it is kind of, quite spread out.
Interviewer	Okay
Student 1	Hmm, which is something that I like. I think it is good and um, my boss encourages me to do other things, not just sit in front of the computer. Yeah.
Interviewer	That's wonderful!
Student 1	Yes it is. (Intervieweraughing) first place that has been like that.
Interviewer	Great, that sounds like a really good place to work in.
Student 1	Hmm, I am sort of stuck there at the moment. That's okay because I don't want to go anywhere.
Interviewer	That's okay for the moment you don't have to keep moving.
Student 1	Yes, well, when I first decided to move from my first office because of, a whole lot of reasons, which some I discussed earlier. Um, that, I decided that I needed to move around to see how different offices operated, just to get a feel for how other people work and whether I am in the right industry at all. If everyone had worked the way that those offices that I was at first then I probably wouldn't of stayed becoming an

	architect. It would have given me the shits and I would have, either I would have to go it on my own and change it or just do something else because it is, sort of, a bit, demoralising, I guess.
Interviewer	I can understand that!
Student 1	Yes.
Interviewer	I hate to stop you there but we've covered the timeframe that is allowed for the first interview.

Second interview occurred with Student 1 a week after the first interview
Time duration: 1 hour

Interviewer	Okay, so we are talking about details of your experience at the timber workshop at the beginning of this year. Now the first questions that I am going to ask you, is the social setting to get an idea of the context of the people that you were working with, because you were working in groups a lot.
Student 1	Right.
Interviewer	That has a big impact or influence on how things operated and fitted in. So I just want you to talk a bit about the relationships that you had with different um, individuals and if, first of all you can talk about your relationships particularly with your group members, Student 3, Student 2 and Student 4.
Student 1	Okay, um, ... I think, I think that um, part of this is related to what we talked about last time, is, in terms of relationships. ... I think that I took on more of an observer... um, it doesn't take me long to go into that observer mode. And I would have stated what I thought while we were working together and I would have, um, and it would have been just a case of sharing, um, of what we were doing. Um, but for instance like even if I was, mm what are words to describe this, if I, um, ... I can say that I didn't, well that I didn't really connect with any of those other people, like off the bat. Like everybody was, um, were different to me. Like there are sometimes when you can turn up in a group situation and very quickly you can sort of connect to people, that sort of think along the same lines and agree and, um, work in a certain way whereas all the people in the group that I was in were um, a little different in certain ways. So there wasn't like an instant connection there that I felt. And, um, which would of, it would of provoked in me a sort of, um, more step back and see what everybody is about um, it is sort of, a judgment thing. Does that make sense?
Interviewer	Yes.
Student 1	Um, ... and it sort of difficult to recall, the relationships with each of those people. Um, and I think there were definitely points in time that were um, that you know I would have been frustrated with each of them in a different way, except for Student 4. I don't think that I was ever frustrated with him, he was, um, he was sort of coming from a different, um, not a different background but um, he was, um, I guess, I guess he didn't because he had just started or was about to start uni and we were, sort of towards the end. Um, that was like a different link and he even ended up during the course of that week um, hanging out with a few different people by the end of it. Um, I am not sure if that was a result of the way we treated him or whether it was, but he had different connections. Um, ... and, with, um, um, with Student 3 I just um, I didn't necessarily agree with most of her views but um, you know, we just sort all just let it work through whatever we were doing. Um, but I sort of voiced my opinion but I kind of didn't want to argue with her much. Um, and, ... um, the other point was when we were, when we, I spent quite a bit of time um, doing the computer drawings. And during that time, um, there was, I was there and they were, um, um, ... what's his name again, I've forgotten now?
Interviewer	Student 2
Student 1	Student 2, that's it! Um, Student 2 and I spent a lot of time together. I was actually doing the drawings and, at, at one point it got a little frustrating because I was doing the drawing and he kept telling me what to do. So, and, I think that he was frustrated because he had to sit there and watch. And, um, he would of wanted to help as much as he could but it gets a bit annoying when your the one drawing something and someone continuously just telling you just to do, That's what I remember, um, I think about it a little bit, um, I don't know. Is that enough for the moment? I think more will come up with more I think about it, but that's the initial memory that I have in terms of relations with those people. Um,

Interviewer	No, that's great. If you happened to think of anything else, just feel free to make further comments. Now if I move to your relationship that um, yourself had with the rest of students in your group. Did you have much of relationship with the other students that were in the pizza hut group?
Student 1	Um, in terms of, are you, are you just talking about the overall time that we were there or just during the actual time that we doing the workshop? Um, that's another thing, I guess I didn't, um, I don't know.
Interviewer	Well, you can talk about both aspects, to be honest, because I am sure that it would of played into the social aspects and um, working aspects.
Student 1	Yes. Um, no I think, um, that there were, there were a number of people that were kind of, just, like it was like what I was saying earlier you kind of, like your personality gravitates towards certain types of other people, I guess, um, automatically. And then to make connections with other people you have to kind of work on it. And I think that Tom and Lenny were, were you know, um were the people that we sort of hung out with and even during the workshop and we sort of agreed on a lot of things and we could just, basically things would happen. So they were, it was like, a reasonably strong sort of, um, relationship during the course of the whole time there with them, um that I can remember. Um, with most of the other people, um, I don't, um, like there, there was like a whole group of people obviously, but specifically I kind of find it difficult to remember them individually and what my relationship would have been with each of them. Um,
Interviewer	That's fine
Student 1	Yes, I think that's, that is it for the moment.
Interviewer	What about, what would you say, um, your relationship with the lecturer [Lecturer 1] that was assisting you with the XXXXXXX
Student 1	Um, ah, I didn't, I don't think I spent a lot of time speaking to him/her directly but it was anytime we sort of did things, um, it was more, it was kind of an open discussion about certain problems that we were working on. Um, it was a, just a case of, you know, what we were doing, I would usually contact him/her early if I had a problem, or if I was working on something I was trying to solve or trying to work something out I'd kind of discuss how I might go about it, and then sort of work out a way to do it, and he'd/she'd often guide me and say why you should set these things out in this sort of order, is how you should go about it, and I'd just sort of follow that and work within that. But besides that, I don't, I don't recall, sort of, um, doing any more beyond that.
Interviewer	That's OK. And thirdly, can you talk about your relationship with myself, as the interviewer, or the observer....
Student 1	Yeah....
Interviewer	....or the shadower of your work?
Student 1	As a shadower? Um, OK, ah..... It's probably um, it's like a grey area because we all sort of spent a fair bit of time, um, you know like the whole time I was there, um, sort of on a social level as well. And I don't know if that sort of had any bearing on the whole, on the whole relationship between what you were doing when we were in the workshop, and, um, and just in general. Like if we hadn't spent, if we hadn't gone, I don't know, sort of drinking wine one day or gone out for dinner or gone out a few times, I don't know if that would've meant that there was a different, sort of attitude, or relationship between us, um, during the actual workshop. You know what I'm.....?
Interviewer	Yep.
Student 1	Yeah, so I think it was, I felt it was kind of, it was more relaxed, like it was a lot more, um, relaxed than say with Lecturer 1, with Lecturer 1 was more formal and XXXX what I'm doing, helping, or 'is what I think working?' And, um, it was a lot more relaxed, like you know, there were times when we just got the lab results, totally irrelevant stuff, that wasn't relevant, oh, ah, wasn't relevant to what we were actually doing. Um.
Interviewer	So do you think that casual approach made you less apprehensive?
Student 1	Um.... Well possibly. Um, um, just by the fact that I'm not aware of being, um, you know – apprehensive in the first place maybe an indicator of that. Um, definitely would help, you know? I think so.
Interviewer	Just trying to determine whether, um, in the first few days when you perhaps didn't know me, and it was a new experience whether you found it difficult or strange or it made you think about how you were working or what you said.

Student 1	Um, possibly that that would've been, it would've been, like um, it wouldn't have been, wouldn't have played a very significant role for me, personally I don't think. Um coz, I mean obviously your XXXX changes once you become more relaxed with the people around you, um but, it wouldn't have affected what I said or the way that I behaved, like mainly it would've affected how much I said. Um, if you know what I mean, like I wouldn't, I'd probably start, I tend to talk too much when I XXXXXXXX (have other people around me???) – but when I don't know people, I don't talk so much. So that – it would've probably affected that more than the actual content of discussion, or um, or the attitude of what was happening.
Interviewer	OK. Now the next question we're going to look at, if you can first of all when you think of it can you just recall details more so than opinions, focus on the details initially and if there's some overriding opinions or feelings that are attached with it – discuss that secondly. What I'm wanting you to do is can you reconstruct a memorable day or event during the workshop?
Student 1	OK, um.... I think most of the, one of the most memorable parts of the whole workshop was the night that we were assembling the um, shelters to XXX on the last day that we were at the site. And, we had all been, um you know frantically running round all day making our individual bits and pieces and people working on the seat and the frame and I'd been working on the roof for most of that day. And the bit that sort of stood out in my mind out of the whole workshop was when we braced everything up and winched everything up and sort of put it together, and there was and the entire team of people were all-of-a-sudden focused together um on the shelter, because all the pieces were there and we're all working like - it was almost like a pit crew, you know - screwing the shelter bits together, and just the sort of, the XXX and coordination of all the different people in what they were doing and we had like I don't know, six power drills and they all had like three, two or three that were just for drilling one sized hole and a couple for drilling another size hole and there were XXXX screwing certain types of screws and power-sinking and all the rest of it. And it was like two or three levels of people where the were people like me who I was all over the roof, doing a certain type like screwing holes and drilling the screws and counter-sinking but there were people below me who were just passing drills and edging, um, the drill bits and the screws, and they were, there was like seven of them just involved in handing over the correct equipment to the correct people so it would all happen really quickly. Um, and that sort of in my mind stood out really strongly in the whole of it XXXXX the teamwork was so evident, um in the whole thing, that I thought it was quite, it was quite magic. It was a bit of an adrenaline rush at the time.
Interviewer	OK, so that's the most significant thing – there's nothing else that.....?
Student 1	In terms of the actual workshop, it was about, yeah, I think so. I think that was, like, that was, for me for what I thought it was about and what we got it of it. And that sort of – I mean there were lots of things that I thought were very important, but that was kind of the point where it all kind of came together. I mean that was, um, the other bit was when we were installing it, or trying to get it onto the truck you know, that was another thing where you had everybody but I think that was, that was quite strong that one.
Interviewer	Great, well, now if I lead you through the actual process a bit more and ask you to think about the actual first day – can you remember much from the first day?
Student 1	Um. OK. I think there were, there was a couple of lectures, and I remember very little about any of the lectures – the lectures that were on. Um, but apart from that, there were books on handouts that prove that I don't remember any of it. But anyway. The actual steps in the workshop were um, when we got split up into the different groups and teams, and we started making these models of things, the shelter, and being introduced into the little groups, and then the whole speed at which we were actually required to sort of model something being together, was really um, different. For me I never, um, sort of I'd never worked in a firm, well I'd met well I sort of what stands out, it was kind of like shock, but it was um, the unique thing about that first day when we started doing all the modeling with the cardboard and the pencils. And the glue gun. This glue gun which we all now own ***laugh*** one of each.
Interviewer	How did you find the, the design process that you were asked to take onboard – the strategy of working in a little group, and using models to explore ideas. How did you find that – just dealing with one segment of that – an actual product in the end?
Student 1	Thinking about the whole thing?
Interviewer	Yes.

Student 1	Um, that was, I just thought the idea of it and I thought it was, um a way, I thought it was, I thought it was um, a way that the, because there was no group of people that was really large all asking to design the one small object, um, it was a good way of dealing with breaking the task down to maintain some kind of progression, so we wouldn't all get bogged down into one thing. Um, it was a little frustrating because you know, obviously you felt like you were doing something that you had no idea really what was going to connect to anything else, and that sort of um, you know like I was working on a roof, but you know, a roof requires all this other stuff which other people were working on that I had no idea about what they were doing. That was sort of difficult to come up with different ideas for things that had like, missing bits, if you know what I mean like for the whole concept, so XXXXXXXXX there were like missing links that you didn't know about. It was also interesting in that respect. XXXXXXX that you didn't have to worry about the rest and you just focused on that bit, and left, you know you knew that later on, just somehow, that would work itself out. Um, so I found that interesting, I found it was a good way to go about it. Um, I think the most, one of the strongest, or the most interesting things about that process was that we were given like 20 minutes or half an hour or 15 minutes to do, to work up a certain number of examples in our little groups or teams. We spent most of that time, sort of not doing nothing, but thinking about what we were going to do rather than doing anything, and then all-of-a-sudden at the end there were all these things that sort of came about in a very short period of time. Um, and I say that only because the initial time like half an hour seemed ridiculously short to begin with. Yeah, we sat around for 15 minutes trying to think about what we were actually going to do, so then we only had like five or 10 minutes of hands-on to actually do it anyway, and still got it done. And that surprised me, I didn't think that that was possible before then. Yep, that what I……..
Interviewer	Did you um, find it, you've expressed a few of the, what would you say, certain things that occurred within the design process and working with a group – those sort of um, different relationships that come into it, and different personalities and different design ideals……..
Student 1	Yeah.
Interviewer	Do you recall at all the events where you guys as a group were proposing a roof and a structure?
Student 1	Um……
Interviewer	And in opposition to what the actual structure team was proposing?
Student 1	Oh, OK. Oh…. I don't know if I recall that. I think there was…….. Student 2's idea for the curved form of the structure, which came of in the case of the roof is what you might be referring to. And I sort of I remember that, but um, I don't remember feeling any conflict about it, um, but I do, I do, I recall the fact that things like that happened a number of times and they kind of even, they happened in the other group as well, um, that was doing the other shelter, where, um, we broke up to do all these different components, yet somebody, or some people would talk to um, you know the whole, like somebody may have XXXXX the whole bus shelter XXXXXXXXX what they were thinking about. Um, that, um, I'd try, I personally don't remember doing that myself. But I don't – I could be wrong, I could be mistaken. Um, I think what you were referring to was Student 2's one with the curved shape XXXXX Is that right?
Interviewer	Yeah, um…….
Student 1	I think that's what it was. That's what I recall.
Interviewer	Well that's what I'm chasing. I've got……
Student 1	Do you want me to recall it?
Interviewer	I've just got notes and observations about it, and um, yeah, I was just interested to know whether that features heavily in your memories of that process.
Student 1	I think, um, one of the big things, and not necessarily in my group, or my particular team, or whatever, but in the whole picture of it, and talking to Mike and Olivia as well, the big thing that um, was sort of……not……..it was kind of countering what I thought the workshop was about at the end, though I didn't quite understand until towards the end, I didn't realize um, was the fact that, you know, we were all broken up to do all these individual bits and work on those, yet some people sort of said oh, you know, stuff that, I'm gonna, I think this is gonna be a really good bus-shelter and build the whole thing. And, um, and I don't know, I don't think it was a case, it was as strong in our group as it was in the other group, where the whole form of that bus-shelter came about from one particular person's model of the whole thing. Um, and I

	wasn't sure at the time, I don't think that's what the whole process is meant to be about, but, um, it just sort of shows the whole conflict of people, too many, oh, not too many, but a large number of creative design people trying to get their bit in, and some of them just going, well I think it should be like this, and just throwing it on the table. Yeah.
Interviewer	OK, what do you recall about the client presentation and approval process?
Student 1	Um, OK. There were, I remember that there were um, two, there was one presentation that we did for the client at the workshop, then we did um, another presentation at the council. Um, and we also did a presentation for the guy from XXXXXX, I've forgotten his name
Interviewer	[Architect 1]?
Student 1	That's right. Um, and that was, that was, I mean he/she, the presentation to him/her was sort of the point when our whole group was sort of struggling to get consensus about where we were going. And um, you know, there was a bit of arguing going on and what-not. But um, there was the presentation to the client, in our, in the workshop, it was um, with the large-scale models, that was the first one done with the large-scale models. Um, *remembering* I think there was more, not opposition, but there was more questioning of it at the first stage, whereas the final presentation was kind of, just wanted to show everybody what it was going to be like and it was just, you know, semi-improved already – we had already discussed a lot of issues, and it was just like a file, and this is what you're going to get. Um, it wasn't, it didn't XXXXXXXXXXXXXXXXXX didn't seem more like a consultation like the first one, and the one where we had some of the others that were in between there. Um, but, um, I don't know.
Interviewer	How did you end up drafting up the design before the, before the actual building was made? How did you end up getting that job?
Student 1	Um, I think part of it was, when we…….somebody I think when we got to making the thing, um, there was like a group meeting or a team meeting when, you know we were, after there's gonna be certain people are gonna need to break up and do certain specific XXXXXX so somebody was gonna have to draw what we were gonna have to build or work on the drawing. And, um, somehow I decided, or I volunteered for that because I could use the program that they had on site reasonably well. But I had decided to do that under the condition that I wasn't gonna spend more than a certain amount of time doing that, because I didn't go there to…….I didn't go to Tasmania to do what I do every dayat work. *Laughs* Um, so I think somehow I fell into that because I've got experience, and I, and I think there was also a, and that we were doing something in three dimensions on modeling – doing some modeling. So, trying to work out um, something about the building, so we used that XXXXXX on all levels to do that reasonably quickly. So that's how I got to that point.
Interviewer	So, your feelings towards having to do that was that you were happy as long as you got to have some new experiences as well?
Student 1	Yeah, I think um, I, I would not have, I thought that, I mean somebody had to, the decision had to be made and somebody was gonna have to sit down at a drawing board or at a computer and document um, to a certain extent what was gonna have to be built. Um, and I kind of didn't sort of leap at the opportunity but I thought, you know, I think the fastest way to get it done was um, you know I had a certain amount of experience and I thought I could do it, um, quickly and efficiently, and not sacrifice my experience there working on the project too much. Um, so I sort of um, almost volunteered I guess. But it was, just, had I been stuck on the computer long enough, um, then I had, I would've, I would've been a little bit annoyed. But you know, I started it so I would've finished it, but I tried not to see XXXXXX I think I was, in total I was there for two days in front of the computer and bits-and-pieces around……..
Interviewer	What type of role did you take on when you did join the rest of your team members in building?
Student 1	Um, I it depended – there was a number of different things that I worked on. Um, and some of them I was just helping out, at a particularly point with something that somebody else was working on, um, because there wasn't anything to do at the time, or waiting for something, or something was being painted or whatever. Then there were other things like the roof of the building which was, you know, the bit that I was involved in initially – I spent a lot of time um, I spent most of my time helping to build the roof, XXXXXXX the other people with which I was part of the roof team to

	help me do that. Um, but so they kind of like, it was a varied.....level of responsibility. Um, you know with the roof or whatever, I um, I felt that um, most of the time I was doing more on those things. But there were, I, there were parts when I was doing other things and Student 3 and Student 2 were working on the beams and cutting in notching and all of that, and there was no point interrupting what they were doing, so yeah, they were kind of doing that while I was actually drawing I think, at one point. So I'm not sure, it's one of those things I mean you think that you're controlling a stage, because when you're there you're doing.....

Third interview occurred with Student 1 a week after the second interview
Time duration: 1 hour

Interviewer	OK, the third interview is about reflection on meaning.
Student 1	Right.
Interviewer	So, some of the questions I'm going to ask you to are relating to the fact of how potential experiences, like the um timber workshop may have augmented or changed your thinking process, or your attitudes towards things.
Student 1	Right.
Interviewer	It may not have, but um, this is just to find out what your appraisal of the situation is.
Student 1	OK.
Interviewer	So, the first question's going to have two parts to it, but it's a very similar question: given what you have said in your previous interviews, um, before you attended the um workshop and you current education experiences, do you think your design process has changed since coming down here?
Student 1	Uh, I think that what we did in Tasmania, uh hasn't...has had an effect on the way that I look at design process. But I haven't done anything that uh, I could relate directly to it since. So, what I mean by that is – all the things that I've worked on in design, say at university or at work, have been on a planning level, or a master-planning level for medium to like larger scale residential projects. So a lot of the ideas and thinking behind the course in Tasmania, not, not necessarily relevant – they're not irrelevant, but they're not necessarily relevant to what I've been doing since.
Interviewer	OK. What about your attitude to architecture? Do you think that your experience down here had any influence on your attitude to architecture?
Student 1	Uh, I think so. It just didn't in terms of the difference between what was conceptual ideas, that people and architects and designers come up with, and they're sort of ideological state, and the difference between that and the actual...finished result. And you kind of, you spent a lot of time, especially at, XXXXX for me, it's so fast since I'm still a university student even though I'm working, most of the things we do are hypothetical, so you never actually need a difference between what you are trying to portray, and trying to design and trying to come up with with the real thing. So in that regard it has influenced me and to that effect because you can see um, what it actually takes to get that result, and also are the differences between you know like an idea that you might have about something and then trying to make it happen. Um, but, I don't know, the obvious problem with things not, not necessarily being tied down, but being a lot more complicated than they appear when you're first putting those ideas down.
Interviewer	Mmmhmm.
Student 1	Yeah, so when, when it comes to actually doing design and being in the process, like even though I haven't had the experience of props in stairs, or designing something and watching it be built, um, to sort of reflect on or anything, you know this is not going to be as simple as it is. Um, if that makes sense I think um that's what sort of – that's the way I look at it at the moment. It's just sort of brings home the reality of the difference between um conceptual design and the reality of building something.
Interviewer	So would you agree with the statement that this attitude or this general acknowledgement of what difference is perhaps between drawing something and actually physically making it – that that was particularly what may influence you when you are designing these days, that you may think about it a little bit further than perhaps you did before?
Student 1	Um, I'd like to say yes to that but, because of, because the sort of things that we did over there, I don't know, in terms of what we were actually, what the materials we

	were dealing with, we were designing and making, I don't know, quite, being quite removed from the sort of things that I've been doing at the moment. Uh, it doesn't, uh sort of…directly, that um little parts make that um bring that together. So a couple of small things that I've designed - some furniture and things for home, and that sort of, that's helped me a lot in what we did down there, and the way that you can use those sort of materials which are more relevant to the things I did at home, um, definitely thinking a lot much more about something and come together. Um…
Interviewer	But you're saying in a practical application, you find it difficult to apply uh the experiences you had down here to like um planning design exercises you…
Student 1	Yeah.
Interviewer	…have or…
Student 1	At the moment
Interviewer	… conceptual.
Student 1	Yeah, so if I, if it came to doing something more like a little extension to a house or something uh, closer to XXXXX, or even involving some of the materials I think that would have a direct um, effect on me, and the way that I would think about it. But, because of, that's not the things that I'm doing at the moment, it's you know XXXXXXXXX up into units, sort of there's not a lot from that lot that you can draw from those particular experiences. But then if you came across a building something I don't know – in some XXXX or whatever, there could be a lot more relevant – and do something, you know, joinery or um, I'm just thinking, yeah.
Interviewer	OK, yeah no that's really good. Um, that's, that's a great response. It gives me a better idea of what you think. Can you um in say, a couple of minutes, describe to me your design process. When you're given an actual problem to do at university, how would you describe your design process?
Student 1	OK. Um, at the moment that process, even though it's all controlled by the sort of things that are given to us to do. Because I mean, everybody has their own way of designing something, so that's sort of what you're after from me, but what I'm saying is, before I answer the question is that I don't know, uh, that the some of the process is controlled by the actual uh environments that are, or the house given to us XXXXX. So uh if you were to just give me, just say work this out, then I would XXXXXXXXXXXXXXXXXXXXXXXXX at the moment. We're going to be designing, let's say we're doing, we did a house XXXXXXXXXXXXXXXXXXXXX, but there was something specific that we had to work out according to our tutors. So you kind of go along a set path that explores certain ideas of it, a lot of those, but it is not uh necessarily a direct sort of series of events that I would've picked out myself. Um, that XXXXXX what I, what I tend to do to uh, personally is um focus on a number of key uh ideas and principles and then just work through um drawings and computer models uh, a lot of those, with um, built models, physical models, but for some reason I still haven't uh haven't spent enough time doing that because I guess it was a matter of XXXXXXXXXXX say I'm going to do it then I just leave it, then do it. Um, and that's sort of breaking it up by you know, looking at different ones from different architects and try to overlay that on top of what I'm trying to do and look to input bits of it.
Interviewer	So what's generally the driver behind your design ideas?
Student 1	Yeah, it's actually, uh not the same every time. Like I get, that partly is based on or related to me still being at Uni. So I usually like um, oh, I'd think I'd like to think that I try and look and explore it something different. Uh, and focus on something different every time we do a design process. Uh, but in the end, if it was in the real world, it would probably be more just a, uh just a set of ideas. Um, and that' just because you know, we're still at Uni, and trying to learn different things. Um, so like there have been, there have been incidents of in the past, where I've uh gone, uh you know a whole, trying to start a whole building on something quite abstract, which uh which I've probably would find difficult to justify in the real world, but other times, I've just gone quite pragmatic. Um you know, more conservative, basically things that are just exploring different notions. That, I don't know if that answered the question properly but…
Interviewer	So you, you've explored a few different process, and that's been assisted by the fact the projects that you're given by your lecturers are um playing on those principles of exploration of different ways to do things?
Student 1	I think what uh what has come out of it, and we were actually discussing this uh last week with my boss, who XXXXXXX tutor XXXXXXX as well, is that for some

	reason it's kind of like each tutor uh is really good at looking at things in a certain way, because they're all different, different people. And it kind of for some reason comes out, and a lot of my friends at Uni are sort of recognising this as well – that your individual tutors become your individual clients. And you kind of enter a process of not designing the building uh as they would like it, but in a sort of way that they would approach it. So they're kind of like your client and you're feeding off the way that they think to try and go through a process. And I've sort of noticed this quite strongly in the last semester, because this semester the two tutors we've got are like *really*, from different, come from different backgrounds and different points of view. So they're approach to the whole design process is not opposite, but significantly varied. So you find yourself, XXXX was to present to my last tutor, the processes that I'm going through now, she would've probably not dismissed them, but uh she would've strongly pushed me in a different direction. Whereas, I'd have the same one, generally XXXX, you know, XXXX tutor would, would have gone there and said I don't want you to look at it like that, I want you to do it this way. So without, without sort of saying that yeah the tutors are actually doing the designs for us, but they form a significant role in the way that we approach each uh, design project…of clients.
Interviewer	Do you, when you get assessed on you design projects, do you actually have, do you have the same tutor for the whole project timeline, and then get assessed by the same tutor at the end of it?
Student 1	Uh, yep. What happens is uh, it's changed a little bit over the different years that we've been there, uh, we've been at XXXXX. And what uh used to happen in earlier years was that you had the same tutor during the whole process, and then that tutor, you would present to that tutor, uh at the end, your final presentation, and they would assess it and then all of the tutors go out after all of the students have left and they go over all the work as a group. So uh you know, your tutor then goes through uh with the others, and then they reassess it together as a group, without having seen it before. Uh, then what happened in, that was sort of second and third year, and first year. Then in fourth year, and I think in third year as well a little bit, in the intro-crits which are like halfway through project, uh, sometimes the tutors swapped over, so you got a different tutor assessing you at the midpoint, and you had to sort of go through the whole thing at that point, rather than just adding to what you'd done the week before. And uh, then at the end on the final crit, there was another person brought in, so there was like a permanent two or three people that, one of them which was your tutor, and the others were totally fresh. Uh, and um, and at the moment it's gone back to your, the same tutor assessing you. And then you're presenting to them every week. But they still go around, and they collect in at the end. XXXXXX
Interviewer	OK.
Student 1	Um, there's one exception to that which is the uh, final crit in our first degree, which was last year. They call it XXXXX visiting XXXX crit. And it's actually made up of about eight people. Uh, two are student representatives, um, two or three, or four are academic um professors, or whatever, and then there are some visiting architects, that you present to at the end of the year to get your degree, as your final, final crit for that. So there's one at the end of fourth year, and there's one at the end of final year.
Interviewer	Mmhmm. OK. If we move on, given what you have said in your previous interviews, where do you see yourself going in the future, with your design process?
Student 1	Um. I don't uh, I'm not sure about that. I've often thought about it, ah, that exact question I don't actually know what the answer is, because uh with, with respect to the way I've been doing things I'm in, just by going, say for instance going to Tasmania, what that's done is made me aware of the fact that there are significantly different ways of approaching the whole design process, and it's kind of ah, an ethical, not an ethical, but it's like a decision that you kind of have to face what your beliefs are and the way that you should approach design. And I don't think I've made that decision, so I have to spend more time ah or travel, or work somewhere in a few more different practices, or overseas, or whatever, to try and finalise or decide more uh, a bit more sort of strongly direction of the way that I think things, think that it should be done. Or approached. But at the moment, I would have to say that it's a bit of an evolving thing. Uh, I hope.
Interviewer	OK. Similar type of question – where do you see yourself going in the future with architecture?
Student 1	Um, that's a good question, but I don't know the answer to that. I don't actually uh, I

	don't actually know...
Interviewer	It's, it's OK if you don't have a definite know, or feeling for it, but what, what motivates you or where do you think you look like exploring or something you'd like to do?
Student 1	I think, uh, first of all I'm not 100% positive whether I'm even going to do it forever. But that's, you know nobody knows if really that's what they're going to do, but that's the first thing. Second of all, it's uh, at this point I'd like to uh say that I feel like to uh, investigate a few different things and different feels, like I'm not going to say that I'd prefer to stick with predominantly doing housing or XXXXXXXX or whatever. But um, you know because I haven't been doing it for long enough, in a working three month practices is a sort of side XXXXX it is that I like the most about it. Uh, I quite, I mean at the moment, in the office that I'm in is a lot, it's predominantly housing projects that we work on. Um, and some of my other friends are working like in offices – bigger offices doing a lot bigger infrastructure projects, and things like that. I don't know, I haven't had any experience in those, so I don't know what sort of things, like whether that would've built something more, or not. But I would like to sort of spend more time on maybe changing offices and that just to find out what either I like and I want to get into a certain field, or whether I want to at the end of the day, start my own practice or do something else.
Interviewer	So you're open to many opportunities, and into test-tasting still at the moment?
Student 1	Yeah, because I'm, I'm the sort of person that I don't, I never set myself rigid in a certain way. So I, I kind of, I might be quite set in the way I do things, but I, if something comes along and seems like a good opportunity, I just take it. Like I won't, it'd take too much in breaking the pattern that I've got at the moment, just from, uh, just you know, because there might be a risk or whatever. So at the moment, I'm totally set because I want to finish Uni, then after that it's sort of open, because I haven't got a clue of what it's going to be like, when I'm not, not at Uni anymore. Um, so that sort of, as you would know, chews up a lot of time.....even to think about those sorts of things, quite, you're ah discussing.
Interviewer	Yep. I can relate and understand to what you're, what you're telling me. Now if we move along to the document that I sent to you...
Student 1	Yep.
Interviewer	...my actual interpretation of the conversations...
Student 1	Yep.
Interviewer	...from the workshop. What were your thoughts on that?
Student 1	Um, I thought that...
Interviewer	Be brutally honest, remember.
Student 1	Yeah, yeah. I'm just trying to, I only had, I didn't, I read through it only once, and I'm just trying to think what my initial thoughts were...about. Interestingly I thought I was, I was slightly not, not disappointed in my, myself is the word to use but, but if like, if I'm going to be honest with myself, it's probably a reasonably accurate depiction um, ah of what it was like.
Interviewer	Why wouldn't you be happy with um my portrayal with what I thought your experience was?
Student 1	Oh, I'm not, I'm not unhappy with your portrayal, I'm more unhappy with my own...
Interviewer	But I mean why are you unhappy with yourself, if you think that is um relatively accurate to the experience you had?
Student 1	Probably, it's probably related to what I would see as me sort of stepping further back, and not being um, not as involved, but not as uh, I guess involved is a reasonable way to explain it. Everybody's involved in up-front activities, where rather than, just sort of, and we just got this, the other time when I even admitted that in the first interview, or the second interview, I can't remember which it is now. But um, there's not conflict, oh well it was a conflict question, but it was related to stepping back and sort of um, getting a feel of what's happening before sticking my neck out kind of thing. And that's sort of, I guess that sort of shows in, in this, but you know...
Interviewer	That's a, that's a reasonable, reasonable approach though, when you come into a situation when you don't know a lot of people and it's a new experience, new environment.
Student 1	I think only, it doesn't uh, I just wonder...what I think annoys me about myself about it is that maybe it takes me too long to step back out of it, like because a certain amount of time that I would personally consider that that's a reasonable, that's reasonable, and then there's the point where you really uh, XXXXXXXX you just

	sort of um, stick your neck out and you'll learn more that way. You know what I mean? I mean even…
Interviewer	Yeah there are a lot of people actually learn a lot more from observing, and they're not…
Student 1	I mean that's the approach that I take, but I'm what, I just I guess I'm questioning it with myself whether uh it holistic, and whether there's, there's a slight imbalance there of how much of that, how much um, of the opposite XXX
Interviewer	So do you think you're certain that I'm not pushing my impression onto you? Like in your own heart and mind when you think about this – maybe my observation's completely wrong, and maybe that's influencing your thoughts here, like I'm not that much older than you, and I don't have that much more experience than you, so do you think um, that I'm influencing you too much in your assessment of this?
Student 1	Not necessarily. I mean the, a lot of the things that you uh, that you sort of, that have come up out of it, and what we've discussing now, I've been aware of already, uh, personally. Because I know when I sometimes think about it, so it's not like, it's not like shock-horror, you know – oh my God, I thought it was totally different. Uh, so from that sort of view, I don't think so. I mean sure is there potential, potential that others would, I mean you can look at it at different, different levels and say well that's not appropriate or not, or, or what-have-you. But, so I don't think that you're, that it's an inaccurate, uh interpretation. Um and it's sort of I mean it's…….the theme oh, XXXXXXXXXXXXXXXXXXX um
Interviewer	Well you do bias, don't worry about it.
Student 1	So uh, so, you know, if you, I think I'm taking it into context, and I sort of understand the situation, so I don't, not like taking to, I'm not taking it really hard or anything. Um, it's quite interesting for me, but I don't know. I don't think you're being too harsh. But…
Interviewer	Well, I, I didn't personally see it as a harsh thing, or a bad thing.
Student 1	Yeah, yeah.
Interviewer	Um, and…
Student 1	But it just took, yeah, no that's right.
Interviewer	Um, I hope that doesn't cause anyone grief by reading the appraisal of it. Um, it's, it's not meant to be a personal thing, it's just describing that I believe that interactions between people had an influence on their actual experiences, because it was so heavily, heavily related to teamwork that that people's different personalities and the way they interact with people and how they learn, actually had a big impact on how much they get out of doing something like this.
Student 1	Oh, I think you're right when it comes to that. And that's um, that's where the whole experience of the XXX um, well is affected, because say I was to undergo all of the stuff say on my own or with a group of people that I normally work with, that I'm already comfortable with, it was different. But that's part-and-parcel of the whole exercise. So…well at least I think so. So that's why I don't XXXXXXXXXXXX.
Interviewer	OK. We might come back to some of that, but I critically would like to get on the recording tape, your opinion on, would you agree that through the workshop that you did down here, that the strategies and the direction that you were given in your tasks, that you dealt with design and detail issues concurrently?
Student 1	Um, I think um…..I would have to say yes I think so, only and it's kind of relative to uh previous experiences, so, yeah somebody else that has had a lot more experience in all of this, might say no, it wasn't dealt with enough or not to that degree or whatever. But compared to anything that I've ever done before, I would have to say definitely yes.
Interviewer	When you said you have to say yes….?
Student 1	Oh well, I feel that it's um….
Interviewer	Do you think you'd be able to say no? It's a pretty difficult question to respond that no I don't think we thought about design and detailing together.
Student 1	Um. I would be able to, but like I, like I, that's sort of saying that it's relative to anything that I've done before, or since.
Interviewer	OK….
Student 1	I mean so, in comparison to all the other things um, and there's a lot of thought across on that one. Everything I'd say I've ever done before I kind of, the whole, it was all design, design and XXXXXXXXXXXXXXXXX right up to the end you've just got to work that out as another assignment later. Whereas at least here, there was um, something to build the other models and um at different stages. Like we didn't have to

	design the whole thing and then just build a model. We were still working on the design of things and elements as we were building the larger scale models and the smaller ones. So, so that level there was um, considerable amount of input at both, from both points. Um, which is something um I hadn't done or experienced before.
Interviewer	What to you is the relationship between design and detailing?
Student 1	Um, I think some of it is, is related to bringing through um, your overall concept how to the actual physical making of, of items. But I think ah, a lot of components for what you are doing um, but sometimes I feel that some people sort of carry, try and carry that on too much, and then it's just a bit of, I don't know gobbledygook. *Laugh.* Um and it's really just about making good sensible clean ah inner junctions and connections and things, and actual obstacles and it doesn't necessarily have to relate back to your overall concept idea, because that's, you know, that's just sometimes that's just a way of justifying for what you are doing. Um, but it can help make, it can help make decisions when there are a number of ways to do things.
Interviewer	Thanks for that, we are really close for this tape running out, so I'll um close the interview now, and I'll just turn it off.

Appendix 6.10 Transcribed Interviews with Student 2

First interview with Student 2
Time duration: 1 hour

Interviewer	Now the first question that I want to ask you about is how did you come to study architecture?
Student 2	How did I come to study architecture, well … um, something that I had been tossing up for quite awhile through high school and it was intermittently toyed with, amongst other professions. *But* I knew a few architects through my dad… and they seemed to have a fairly enjoyable lifestyle and I thought I could see myself doing that in10 years time, that was the main reason I think.
Interviewer	Yeah, so it was just your interactions with different architects
Student 2	Yes and the way they perceived life and their..what they did as a sort of a daytime job. I also remember that I loved lego since I was five, putting blocks together and I thought it was a good balance between ..um, creativity, science and art, talking to people and working in an office and being out in the field and a good balance across a field. Although to be perfectly honest it is hard to answer that question now, because having studying it for so long. I'm not quite sure whether I'm talking about me now or me then.
Interviewer	Um, what you can recall as your motivation before you selected to study architecture?
Student 2	Um, the main reason was the people that I knew and the lifestyle that they lead… and the characters that they were.
Interviewer	Do you think that has changed now as you have just mentioned that you been studying architecture for five years?
Student 2	Um, my perception of what I perceived architecture was about?
Interviewer	Um, why, why you think that you are studying architecture now, do you think it has changed any since?
Student 2	I suppose I've got no idea what I am doing now. The main reason that I am doing it now is that I have been doing it for so long now it would be silly to finish 7 weeks before the end…. But as to what happens next year I don't know?
Interviewer	Okay. That's cool. With this, same.. same sort of question, but how did you come to attend the workshop down in Tasmania – the building workshop?
Student 2	Um.. agh, two reasons. One is that I've always, always had an affinity with timber and I like working with timber and thought it was a particularly a good option, to play with some wood and learn some hands on experience and also it something that at university that you don't get the chance often to actually build something and realise it at a 1:1 scale and even a real project and, um, that was my second reason. And, the third reason .. um my dad being involved with it and telling me every year since it started what a wonderful experience it was and how people got out it. And I thought it would be a good thing for me to do. [My] university doesn't actually offer a similar program so I guess I couldn't do a similar thing over here.
Interviewer	Okay. And um prior actually coming to this workshop, can you recall any memorable design and make experiences that you had, perhaps before studying architecture or while you have been studying architecture?
Student 2	Um, design and make experiences ..
Interviewer	Yeah..
Student 2	Um, no, we made a timber box in second year. It was memorable though more for the arguments that I had with my tutor rather than the actual product. Um.. and also in second year a few friends and I designed and built a medical clinic, which was fairly memorable but of course I wasn't doing the building but we actually did construct it. That was one of the most memorable things I have done but wasn't actually physically building.
Interviewer	Okay, what about prior to studying architecture, what about as a kid or being in high school or something like that?
Student 2	I used to make a lot of cubby houses, forts and things. Which were made out of variety of materials not just couches, cloths and pillows. They were fun too because I

	designed them.. (Interviewer laughed) built some cubby houses in trees.
Interviewer	Yep!
Student 2	And forts things. I used to make a lot of models. I suppose that was really more the scale I was working with, because of budgets and various other constraints Sort of .. um plastic models and timber models. I use to make other various pieces of furniture and also I used to help quite a lot around the house when we were doing renovations and things. I suppose that was also a part of it.
Interviewer	Is that... in your survey that you filled out before beginning the workshop you said that you had been involved in a complex building project such as a house, is that what you mean by helping your... um
Student 2	No it was the medical clinic that I built in second year.
Interviewer	What is the ... can you explain that bit a bit further?
Student 2	Okay, well. Umm. There were three of us and we had a client who wanted an extension and complete refit of an existing terrace house. And we um sort of , basically designed up and went right through the whole architectural process, from the first client meeting through to the finished product.
Interviewer	Okay so you actually assisted in doing the refurbishment at the end of it?
Student 2	Naa, we didn't actually build it.
Interviewer	Ohh, okay.
Student 2	We employed a builder and went down and did site inspections and, um, followed through more on the architectural side of things than the construction side of things.
Interviewer	Did you find that that had any noticeable impact or influence on how you felt about architecture or
Student 2	Totally, it made me very convinced that architecture is not just on paper.
Interviewer	Do you think that it showed in your following work when you, in the next semester of university?
Student 2	Um
Interviewer	Or is it a difficult thing to do
Student 2	Um... I not sure if it would have shown in my work, I am sure it would have done, It affected my attitude towards it and the way that I write and think about architecture. Um but the nature of university projects when you're usually taking them to 1:200 or 1:100 scale. You never really get the opportunity to deal with the problems that you get when you start building at 1:1.
Interviewer	Do you find that personally a bit frustrating or is that just how it is?
Student 2	I think that sometimes at university can be slightly frustrating with the time constraints that you are moving through projects relatively quickly, between 6 weeks or 12 weeks, that is maximum length of time that we have ever worked on a single project. Um, but at the same time its not that (bad) because you get to see lot of different things and focus on lot of different issues, um, whether it is purely theoretical or practical. But, um I think it could perhaps be a problem with architectural education that we don't get enough chance to actually build. And I think, perhaps an apprenticeship system, maybe quite effective like they do in Canada or the way UTS do it.
Interviewer	Okay. I just lost my train of thought for five seconds there. You struck a chord with me somewhere there and I was going to ask you something else about. Um , I was just wondering if you've had many experiences in offices before architecture or during holidays or during university?
Student 2	Well, [at my university] there is a compulsory year out in third year and have to do a minimum 6 months in an office. And so I did that in 1999, and worked for 6 months in an office in Hamburg. And since then, I... since I have come back to Australia in 2000, I have been working for a large architectural firm, part-time and still am working.
Interviewer	Okay, so the firm you worked for in Germany was that Asmus' firm?
Student 2	That's right.
Interviewer	How.. Did you find much difference between Asmus' firm and the firm that you are working in now?
Student 2	There was a huge difference, actually. Yeah
Interviewer	Have you got any preference for which firm you worked in?
Student 2	From.. (pause) an understanding of where you stand, it was easier working for the firm that I am working for now. They're a large corporate firm and they have a lot of

	systems in place and they have an office manager who makes sure that those systems are adhered to, which means, that hence the running tends to be a lot smoother. Um,, but at same time it can sometimes become, perhaps a little too organised and there is not as much flexibility, um ... and there is not as much chance to experience different things as you sort of get boxed more easily there if your not careful. You have to speak up a bit to let them now that you want to try something new. Um, it is also tricky to say because when I went to Asmus' firm I was going for the first time that I had ever worked in an office... And I was also working in Germany where I didn't speak the language 100% fluently , like I do English. So, the availability for me to help and participate wasn't as great. Um, now that I am older and I have got more experience and I am also using my own language, means that I can get a lot more involved here.
Interviewer	Um, that's fair enough. I question that as I have seen some of the work that has come out of Asmus' office.
Student 2	Yep
Interviewer	The corporate office that you working in now. Do they have a similar approach to design or using models or um, that sort of thing?
Student 2	Relatively, similar approach to design, yes. Although, I think that the firm that I work for now, is ... tend to, most of their clients tend to be large scale developers, which always put a slant on the type of work that you do, often. Where as a lot of the work that Asmus was doing were schools and public works, the bus station just to name one. And I think probably the level of competition to get work has ---- although the nature of how architecture works in Europe is by competitions. We did more in Asmus' office, then we do here. We probably do one competition, every couple of months where as they would do one competition every couple of weeks.
Interviewer	And in the presentation of their work with both firms, agh... are both firms more likely to present computer drawings to a client, like an animation, perhaps.. or just,
Student 2	Our firm now that I work for has just started employing a full-time graphics animator, who does 3D models and animations. A lot of the time that is for competitions or marketing. And, um, so we have only had a push for that in the last six months really, since the firm has started working that way, and photoshop and things have started to become more common as presentations rather than pantones and colour pencils... But there is, but, in the firm that I am working for are very interested in technology and using that in their architecture but they are still a bit slow in implementing it. They don't have enough Photoshop licenses and they don't have enough computers for all the staff, so there is a lot of hot desking. They have even taken off Word of some people's computers, as they don't have enough licenses, which is incredibly frustrating and, um, and I think that has been annoying, quite a lot of the staff. Um, but Asmus' office was even worse, they um, were still running Windows 3.1 and um, AutoCAD release 12 or something like that. And, um, it was very, very hand based office, and we didn't have photoshop or any other thing like that at all, certainly no graphic animation packages. And when we were doing collaborative projects with the Paris office, it made it very difficult because they were rather computer literate and the focus of their work was to document and email files between the offices and basically Asmus' office didn't have the capability or even the know how, to work like that.
Interviewer	Okay, so does Asmus' office still make models? Did you have to make model while you were there?
Student 2	Yes, both offices make lots of models. Um, I have made lots of models for both offices.
Interviewer	Um, what sort of material and what sort of scale?
Student 2	Card, foam. Um, a lot of massing models. We do at both offices using foam and hot wire cutter and the scale depends on what type of project it is. We did an urban project over there where we were working at 1:5000, and if it was small house scale we would massed it up to 1:100. Um, but then after that it was a lot of developmental models, which were at a 1:100 scale and cardboard and attention to (?), and structure out of (?)
Interviewer	So mostly their models were for context and to perhaps help explain to the client or to the developer in a broad sense what it is like in its environment?
Student 2	Um, I guess it was used to explain the scheme but a lot of them were design models and working models, so they weren't to show anybody except the director or the

	project architect. Ones that I have been working on have been form models so that they can get a 3D idea about what it is they are sketching. Um,
Interviewer	So they are using both computer models and um, physical models as in card or foam to inform their decisions.
Student 2	Yes, mainly more physical models, because there is only one person who does 3D modeling at work, sort of in a (?) sense. That is not usually used for form making but because the form has well truly been decided and it used for marketing or a competition. Um, (sentence missing - too difficult to interpret) There is, becoming be more 3D work being done. With regard to form than the physical (difficult to hear and understand end of sentence)
Interviewer	Okay, can you just wait a minute, Ian's just coming into the office. I will just be a moment.
	Break in interview for 5 minutes.
Interviewer	Okay, so what other things did you recall that you built?
Student 2	Sets, I built quite a few sets.
Interviewer	During your high school education?
Student 2	High School and University, more during University.
Interviewer	Okay, for like community productions or something like that?
Student 2	Yes, University productions, usually
Interviewer	Oh, okay.
Student 2	and reviews
Interviewer	And how did you become involved in that?
Student 2	I have always liked theatre and … um, yeah, basically found out (laugh) what was happening at uni and talked to people and got involved. After you have been involved a few times, people come up and ask you because they know you have been involved and you can do it.
Interviewer	So it is an extra curricula activity, is it?
Student 2	Yes, it has got nothing to do with Faculty.
Interviewer	Fair enough (laughing)
Student 2	(laughing) sorry, it is a long story there
Interviewer	No, your answer is fine, so you have done it a few times then, I take it.
Student 2	Yes, usually once a year, or twice a year. In second year we had a theatre company that toured around, so that was quite a lot of involvement.
Interviewer	Okay, and do you think that you enjoyed it doing that sort of production and things because of the social aspect of it as well?
Student 2	Yeah, I love the social side. I think that is very important.
Interviewer	Because I imagine with your building, you were building with lots of other people and,
Student 2	Yes
Interviewer	Sort of designing with lots of different groups of people as well?
Student 2	Usually, … usually it is a small team of designers. Often if it is a very small thing then it is one, but building is always collaborative effort. It is actually quite hard to find people who want to help. Everyone is always keen like "oh yeah I'll help" but then they paint one side of box and then people disappear. So you have to sort of find people that are already committed or find a hell of lot of people so if they all just paint one side, then that's enough.
Interviewer	Yes, how sophisticated were they?
Student 2	Um,
Interviewer	What type of construction?
Student 2	Some were really simple. The one this year was really, really simple. It was series of boxes, with silhouettes. Um, one idea in third year was very sophisticated, um it was for the "The Little Shop of Horrors" set and, um it about, um, 4 by 5 truck on wheels that rolled out on rails, which was the shop. And that rolled out on, an 8m high wall, which was 15 - 25 m long. And it was painted and various other things that had to happen on that set. But to get that truck to move with up to 5 or 6 people on it at the one time.
Interviewer	It always is a bit of challenge. So have you, … when you have been involved in these activities, with set design and everything have you ever lead the design in any of that or have you mainly been collaboratively, helping in the building of them?

Student 2	I've designed some of them. But often, I suppose with most of the big ones that I did, I was sort of, in charge of the construction side of then. The designer was very good in being able to read the play and understand what would work where, but had very little idea about, how to put it together, and make it work and what was possible and what could be done with the budget, those sort of things. And I would tweak the design I suppose, so that was a team effort then.
Interviewer	Fair enough, so did you have much when you were building or were you given some materials and given a bit of a drawing to make it from?
Student 2	Well, no, … in most cases, usually the set designer had a concept of what they wanted to happen and how the play was to read with the concept design and usually I would turn the concept design into a schematic design. And then I did the working drawings and then the construction itself. And there was very rarely materials given, it was usually just money. So it meant that anything was buildable within a budget and wasn't restricted to certain things that we already had.
Interviewer	So you did have to deal with issues like that, like, um, working out how much material could you buy?
Student 2	Yes, we had to do all the ordering and everything like that.
Interviewer	Did you find that challenging the first time you did that?
Student 2	Yeah, and I still do! We don't do enough of it and prices change and often with these things you are not given an infinite budget but incredibly small budget. Which means, also that you could work out one way of doing things that is the most efficient way because you buy everything but then someone might say " We have found someone dad that has got this on a farm and we can use that." And so, you end up twisting it around to incorporate those things, which I find difficult.
Interviewer	Did you have much support, like to work these things out or did you work it out within your group of enthusiastic teammates, of how to?
Student 2	Most of it was worked between friends and I would always ask as many questions as possible from many people as possible. And there are few in the department at University, they are helpful. And the maintenance man at colleague has been very helpful. And they got lots of experience which is very helpful(to difficult to interpret sentence)
Interviewer	Okay, .. well I think that is plenty of questions and thank you very much for your time.
Student 2	Was that helpful?
Interviewer	Yeah, it was, it has given me a lot more insight as to what your experiences previously have been.
Student 2	Yep.
Interviewer	In that sense because, that is the idea of this interview is to gain an idea of what your background is, in the sense of things that motivates you and why you are involved in architecture and just all those things. And you know how those experiences have very much, you know how previous experiences have made the person that you are at this point in time. … So, …that, this was the idea of this interview was, to find out what additional things like that and like how much previous work experience you have had and just your motivation to be involved in community theatre and making things like that. Obviously you have a bit of interest in making.
Student 2	Yeah
Interviewer	I don't know whether that is a fair, interpretation?
Student 2	Yeah, and I like making and also like organising. *That's probably why I enjoy the theatre.*
Interviewer	If you didn't, um become an architect what else was on your list of ?
Student 2	Um, Fighter pilot.
Interviewer	Fighter pilot
Student 2	Fitness Instructor, um .. I.T, (?) and theatre director
Interviewer	Okay so there were..
Student 2	And management consultant.
Interviewer	Are you still looking at, perhaps a creative field in the future at the moment? I heard that you were talking to a few, big management, creative, sort of organisations?
Student 2	Yeah, at the beginning of this year I was looking at management consulting. I've loss interest in that after the interviewing process. Um, I still always wanted to and am still interested in the theatre and that is something that, I probably still stay on the set side of things. I have often looked at directing and producing a slide event, but I can

	probably look at picking that up again. Um, at (?) level, may be sets at a professional level. The I.T stuff, I still have an I.T. business, which I want to continue with. That's doing construction I.T, for small and contractors, and
Interviewer	Um, what type of I.T.?
Student 2	Web stuff
Interviewer	Web stuff. Okay so like designing web pages and stuff?
Student 2	Yes … yep, for a very specific market.
Interviewer	What sort of specific market?
Student 2	Sub-contractors, mainly small time building industry, because the building industry we feel are a little behind with their involvement in web technology. There is a lot of opportunity for it.
Interviewer	And do you have many clients or many experiences with this?
Student 2	No, we have three clients at the moment, which is pretty small, but um, basically we, um, started it and then I went into my final year of university. Crazy that I got involved with another project, and my partner got himself a full-time job with Baulderstone Hornibrook working in an I.T. department. So he became very busy and was over all parts of Australia all the time. So we sort of, let it slide. But it still something that I am interested and want to pick up again.
Interviewer	I was going to ask, your partners in crime that are in business. Are they all architecture students or friends of?
Student 2	(Building students?), no my partners in crime were a lawyer and who else. Yeah, no, all over the place.
Interviewer	So lots of different (?) and different perspectives.
Student 2	Yeah
Interviewer	Fair enough. That sounds wonderful.
Student 2	Yeah. It has been good fun. But, yeah with outdoor education that was when I finished school and wanted to be an instructor. But after doing that for a year I realised that it wasn't really that much fun.
Interviewer	Doing like, it for 12 hours of day, 5 days of week?
Student 2	Yeah, like the same thing over and over again with the same age group. So, it is not the same as doing it yourself, developing your own skills and it is great fun and very rewarding. But, yeah, um …
Interviewer	What type of rewarding bits? What did you like at that stage what was rewarding about it ?
Student 2	Um, particularly because someone would say "No, there is no way I can make it up something like that", and you could encourage, sort of coerce, and various other ways in climbing rock wall situations and then we would see a kid get to the top of the wall and they would have a big smile on their face, feeling pretty pleased that did something that they didn't think they could do. They can do it and you help them get there. Then they take this experience to other situations, where they think that they cannot achieve.
Interviewer	How would you say that you have interacted within teams or group work?
Student 2	Me,
Interviewer	How do you see yourself in within a group?
Student 2	Um,..
Interviewer	Do you think that you take on a particular role at all?
Student 2	I tend to take on an organisational role, more of
Interviewer	Do you think that is just your nature or you are just trying to assist the, um process or ?
Student 2	Probably trying to assist the process, um, but I am sure it is a part of my nature as well, or otherwise I wouldn't do that. But where I have been in teams where there has been a very strong leader or where someone has a very good grasp on organizing things then I quite happy to sit back and let that person do it.
Interviewer	So it is just when you think,
Student 2	I just find , at the beginning, *when the group is new and a direction is to be taken*, I jump into that role.
Interviewer	Do you think that you have always been like that or
Student 2	Yes
Interviewer	Yeah
Student 2	Yes, I awfully bad.
Interviewer	It is not a bad, what would you say, trait to have, and there needs to be leaders that

	can do the job and things like that. It is not inherently bad, there are different types of leader roles. So,
Student 2	I think that/ though ? is good and useful. And I have learnt that it takes ? but sometimes it, pushes over to be bossy and that's not good.
Interviewer	Hmm, ... okay, well half hour has happened now and I am not going to ask you anymore questions, because I have already been talking to you for half an hour and I know that your busy person so, thank you very much for that.
Student 2	No worries, I hope that was really useful,
Interviewer	Oh extremely

Second interview occurred with Student 2 a week after the first interview
Time duration: 1 hour

Interviewer	Well, the second interview today, is on details of experience, detail of experience as you can recall from the workshop that was held down here. So I want you to focus when your responding to questions to me, more on the details, and, um try not to put as many opinions into to it. And I will try ensure my questions don't ask you too many.
Student 2	Okay
Interviewer	This is going to be difficult but try, um, because the first aspect that I want to look at is the social setting.
Student 2	Ah, hmm
Interviewer	And I would like you to talk about your relationship with some of the other people involved in the workshop. If we first start off with your two other group members or three perhaps, um, Student 3and Student 1 and Student 4. Can you give me an idea of how you found it working with them? What sort of relationship did you have with those students in your group?
Student 2	Okay, just to clarify something. How, do I answer this with details and not opinions?
Interviewer	I know it is a bit difficult for this one, just go with your opinions here, but later there is a question which I will bring it back up to you again to say that I am looking more specifically at the details.
Student 2	Okay. So, the question was how did I relate to those three people?
Interviewer	Yes
Student 2	Student 1, um, was very organised and ... quite skilled with what he/she was doing, so and Student 3 was also. And we were all of a similar age bracket and we got along very well. Student 4 was younger and perhaps less outspoken, and um, there goes an um, was perhaps more dominated by the three of us. Student 3 and I ... I think that we all got along really well though.
Interviewer	I would agree with that you, um, got along well. How, how did you end up being as a group, was it just by chance?
Student 2	It was random. It was numbers out of a hat.
Interviewer	As a group, because you, um, thought that you got along so well, how do you think, um, as a group, you guys interacted with the rest of the group in the bus stop for Pizza Hut?
Student 2	Like all group projects there were factions, and at the beginning whilst we were all working on individual components it wasn't such an issue. Towards the end when certain things had to come together and products had to be created, those factions became more noticeable. And I think again that the dominating personalities of Student 3, Student 1 and myself overflowed the other groups.
Interviewer	Would you say that happened at what stages? I would consider that there was a design phase and then there was a design construction phase and I would say that the transition between the two was perhaps, after the council meeting. Would you say that this, um, group relationship changed at all between these phases?
Student 2	The large group or the small group?
Interviewer	Either all, actually.
Student 2	Yes, in both, both I would say. Um, in the smaller group, I don't think that it change that much but once we got to the construction phase, out of the design phase, we were the roof team and we sort started moving into some of the other group areas and that was (sort of) received with mixed response.
Interviewer	... Okay. In the sense of the lecturers that you had involved with the project, um

	particularly Lecturer 1 was involved with the Pizza Hut. How would you say that your relationship was with him/her?
Student 2	(Long pause) ... Fairly casual, I think, less more, then a formal teacher student relationship.
Interviewer	... Am I right in presuming that you had, um, more contact with Lecturer 1 than perhaps Lecturer 2?
Student 2	Yes, yes.
Interviewer	... Um, did you just, did you find it easier to go and discuss matters with them or did you discuss things more with the group or ...
Student 2	Um, knowing Lecturer 2 for many years before hand made it quite easily for me to go up and ask him/her certain questions. But I tried to keep most of them within the group... (particularly ?) the decision-making, because they were, Lecturer 2 and Lecturer 1 were, I would regard were facilitators rather than directors.
Interviewer	How did you find the new concept of, it was a new concept for us, the mentors, um the guys that were assisting you with in the construction and workshop, and things just like that, Tutor 1 and um,
Student 2	In our group they were very helpful, very useful. We didn't, we had probably only 25% of those people the other 75% were with the Chickenfeed group. Um, that was my perception anyway. And I think that the way that we used them was really helpful and they knew the workshop very well and the easier way to find things and putting things together. Um, with regard to the design, um, from the outside of not being involved with the Chickenfeed group, I think maybe they became a little (stronger?) in that group. But that was an outside perspective.
Interviewer	Okay, what would you say your relationship would be with myself, as an observer and researcher of your work?
Student 2	Um, (laughter) ... quite funny. I suppose, you were just always there and I didn't really, and, to begin with you think I'll have to be careful with what I was saying and then, after a while you were just always there, so you, just became part, of the day, as far as what you were writing and typing. And it was also useful because I use to use you as a sounding board for some of my opinions.
Interviewer	... Okay, now heading back into, trying to describe details more so than opinions. If I ask you to reconstruct a memorable day, from the, timber workshop, which one sticks in your mind, more so than any other?
Student 2	... Hmm, ... um, there is quite a few, but I am not sure whether there particular days or whether these things happened on the same days. They were more moments that I would recall.
Interviewer	Well, pick off the moments, as you think of them.
Student 2	The first client meeting was particularly a strong moment. In fact every client meeting, the one where we went into the city council as well, I was impressed with the, um, faces of the, um, Mowbray street council or whatever the action group. They um, it was very, interesting to see their faces and their reactions. I suppose I am supposed to be talking details? And um, they had pleasing expressions, um, the reactions from the Chickenfeed ... per, person, um the representative. That was, that was an interesting reaction. Um, the other memorable experiences were, the actual erecting the final thing on site, lifting it up. The first few days that we actually started building directly with models. I found very memorable, rather than drawing it. It was quite, it was quite difficult, purely using models and not drawing.
Interviewer	(long pause) ... With the model making process, had you done that much prior, before, in your design phase as such?
Student 2	I usually use a model to design, in fact I always use a model for design but I usually do that in conjunction, simultaneous to drawing. I sometimes find that design for me, is between thought and product. And if the process becomes too slow that it is hard to realise what you actually are trying to think about. So I find drawing very useful there, because it so quick but the advantage of model making is the three-dimensionality of it and it can be working in all three dimensions at once, which means that it is a lot more accurate representation of what you are trying to achieve. I think the two need to go together.
Interviewer	Other, um, details about the workshop that you may recall. What other, overall things do you think that you recall from your experience if you were describing it to somebody else. What else would you be saying?
Student 2	About the workshop?
Interviewer	Hmm,

Student 2	Other experience, hmm, the group interaction, were, significant experiences. Um, materials, … (long pause), I am not sure exactly what's the question, do you mind to repeat it.
Interviewer	Um, I just, um, wondered if you were describing, attending the workshop down here to some of your friends. What sort of things would be, um, poignant in you describing it to them? Um, would you
Student 2	Details' from, starting from scratch, through to a finished product, is an important experience actually, seeing something built, working with such a large team on such a small project. So the design intensification and inter-group relations were a valuable experience. Learning specifics about timber was an important experience. Um, getting into engineering side of things, in relations to exactly where you can and can't place holes in timber and end grain cuts and various other things like that you often don't get a chance to touch upon and not at a much bigger scale then 1:100.
Interviewer	Did you find that the lectures that you attended in the morning were related to or beneficial to what you were doing in the workshop?
Student 2	Some were very good. Um, some were a bit propaganda-ish, and therefore the information tended to be less detail.
Interviewer	In consideration of your usual design process do you think, that the research and exploration stage of this design project, even though it was in a really tight time frame. What was your opinion on that matter, was it, … was it adequate or inadequate?
Student 2	The research and the investigation, I have forgotten that bit, which was that bit?
Interviewer	Um, I guess what I am trying to describe is in the design phase, when you started off with your clients' requirements and brief, and you start examining with your models, design ideas. Did you feel there were enough materials and enough explorations going on in that period in comparison to usually how you design, perhaps in a group?
Student 2	I think so, yes. We churned through a lot of models.
Interviewer	Can you recall if all the models were detailed to begin with or were they, did they vary in any way?
Student 2	They varied a lot! Some were very conceptual, some were focusing more on systems, some were focusing on form, some were focusing on function.
Interviewer	Was that more directed by the facilitators or was that directed by you guys exploring?
Student 2	Um, I would say somewhere between, there was a certain encouragement to go for it and make, a lot of just models and explorations. At the same time I think the direction was influenced by the person making it. And some people just generally leaned to one way of developing ideas to others.
Interviewer	If I get back to, um, memorable experiences, do you recall the experience of having two external critiquers coming in to look at the pizza hut model, Critic1 and Critic 2?
Student 2	… yes I do. I remember them coming in. Ahh, I can't remember specifically what they said but I can remember that the general feeling was that it was generally very useful.
Interviewer	… That's they gave you useful comments and strategies and ideas from it?
Student 2	… Yes, but unfortunately though they were coming through with a critique which I think comes from architectural education. That's an opinion do you want me to say that or not?
Interviewer	Yes, you can say that.
Student 2	Um, where there was a similar motive to design and critique, which was the standard way which architecture was taught. Which doesn't necessarily apply directly to a project this scale, like a bus stop designed by twenty people. Because the, sort of abnormalities that people would criticised in a building designed by one or a small group can't be streamlined when there is that many people there. And that was, I found that utterly frustrating.
Interviewer	The difference that you have highlighted between the way that, um the facilitators would critique work, whether it's a group project that you were building or an individual, small team design element. Would you say that is, the differences that also existed in the design process?
Student 2	Yes
Interviewer	(long pause) … In, um, how, how would you say that as a group. I am positioning you as in the group, Student 3, yourself and Student 1, because Student 4 seemed to be on the fringe quite a lot. How did you guys operate as a group to resolve some of the frustrations involved in a collaborative design task?
Student 2	As a group, when we were doing the roof component, we didn't really have any

	conflicts from memory. We all developed various, things of our own and then each had merits and we sort of it was a discursive process where we talked about each issue and developed it. When it came to the large group it was a different story.
Interviewer	I was going to remind you, how did you feel about the integration of the roof to the structure?
Student 2	I thought that was fine.
Interviewer	(long pause) ... Sorry, I am just thinking at the moment and looking at my notes. ... If there is any thing else that is memorable or sticks out in your mind, just, um, say something.
Student 2	Yes, ... I remember the structure, I felt, arhh that, that group was, perhaps not running at the same pace as the other groups, which became an issue as everything hung off the structure. It was tricky to design the roof without knowing what was going on. And, um, it was particularly tricky designing the wall elements and the seat elements. So I felt that, um, that was a potential frustration or was a frustration.
Interviewer	It interests me, um, with any of these, um, recollections that you are pulling up, that the time length that you were actually in the workshop, um, has never come up in your description so far. You didn't, notice the time length that you were there?
Student 2	I knew that they were long days, um, I knew that we started very early and finished really late. But most of the time that was enjoyable and also I was there to be involved in the timber workshop, so I committed that length of time so, it wasn't a big issue. If I had a lot of other things to do, then possibly it was.
Interviewer	Why do you think, that some of your group, um, Pizza Hut, lost motivation or didn't give the same type of time commitment to the project?
Student 2	Several reasons, ... I think that some of them had other agendas for being in Tasmania, and they wanted to holiday and to see some of the, um, state. So when they booked they weren't perhaps aware that it was going to be that intensive. And wanted, they wanted to take out time to go and look around. That was quite possible the reason. XXXXX The other reason is, perhaps that other people didn't get involved because they didn't feel quite the same ownership and therefore same amount of desire to participate. And I think others just by natural didn't have the same sort of enthusiasm or commitment.
Interviewer	I can recall myself that you, um, assisted and encouraged Student 5, do you remember Student 5? What motivated that?
Student 2	Um, a few comments that he/she made. Saying that he/she didn't know how to do this and scared to use drills and like he/she was useless. And I thought that was an unfortunate thing to come away with from the workshop, which was suppose to be encouraging the opposite. So, basically the best way I think to get unscared from using a drill was to pick it up and use it. And it was, it was a good environment to learn how to use those tools.
Interviewer	Do you think that, um, that if you were, all inexperienced people within the workshop, if they perhaps weren't such a confident, and um, a noticeable person, in the sense of making themselves known that may have missed out on some of these opportunities, where as other students that were confident took it on?
Student 2	I think that there is always a possibility to miss an opportunity if you don't give it your best shot. Like that cliché goes that you only get out of it what you put into it, so if you stand back and let these opportunities pass you by, you are not going to get as much out of it. And somebody who goes right in, whether that is driven by confidence or not I am not sure.
Interviewer	Fair enough, I have no other questions to ask you, unless you want to um, stay anything further about your experience down here at the timber workshop.
Student 2	No, I don't have anything specific jumping out.
Interviewer	Okay, thank-you for that. That's wonderful. I'll just stop the recording machine now.

Third interview occurred with Student 2 a week after the second interview
Time duration: 1 hour

Interviewer	OK, this is the last interview. And this interview is centred around reflection on meaning, so from your experiences that you've talked to me about, why you decided to study architecture, your interests in those sort of things, plus your experience in the timber workshop down here, which is just one of your experiences. What sort of, impact that's had on your design process, and your attitude to architecture. So if I

	start by asking you that, from your previous design experiences before you attempted the workshop down here, and your current educational experiences in the last semester, do you think your design process has been augmented, or changed from these experiences?
Student 2	Augmented, I think, rather than changed. Yes. Um, in that respect, see the value in XXXXXXXX more evidently now, doing 1:1 scale using the real materials actually, sort of wastes building the building to its completed stage in sort of test pieces.
Interviewer	OK, but how does that reflect, or how does that work with say, your design work that you're doing now, like it must be difficult to do something like that, in this case.
Student 2	It, well it is, and I think it's very, well.....the design process that you talk about now and....is two very different styles of designing when you're designing for a student project or a competition, ah, which is usually conceptual, not much more than schematic design, ah, as opposed to a commissioned architectural work which is going to be built on XXXXXXXXXXXXXX finished product. There's very different levels of designing that needs to go on, and I think um, what we were doing down in Tasmania was taking things through to the built stage, which is something you don't do very often at Uni, and therefore when I go into practice and I do get the chance to do more building, I will be using a lot more techniques and ideas that were talked about in Tassie, whereas at Uni, XXXX stuff still working at 1:500, 1:200. I don't think the level of detail required is necessarily will change the way that I think about it, because we're not looking at the way roofs meet walls, no connection details, and all those waterproofing issues.
Interviewer	But you must be asked to do some, refined details of these, large projects that you're doing.
Student 2	Well, not really, no.
Interviewer	You're not asked to do a 1 as to 20 sectional detail?
Student 2	No we don't have to do anything where, this year, ah, last year we were. And, that was before I went to Tassie, though. Um, and it certainly it would've been useful then. But again the materials that we were using in Tassie were mainly timber, and a lot of the buildings that we were designing is sort of more concrete construction. So, um, I think the actual process that I learnt down there will be taken with me, certainly when I start building, but at the end, just the, just the way that well, my university's run, we don't generally take things beyond 1:100.
Interviewer	OK. In reference to that, do you think perhaps, if you think in a more broad sense of your experience in the timber design workshop, that perhaps there's um, overriding attitudes or techniques that may, that have influenced your design process at the 1 as to 200 or the 1 as to 100? Or, or is it too difficult to connect the two experiences together to get something from it in that case?
Student 2	I think, in the attitude that small-scale and detailed design influences your major conceptual design on the entire form etc, is very important, I think he wanted a huge XXXXX it was very easy to make it a model at 1:500, but then to actually build that at 1:1 in reality say may be possible, then those attitudes that you need to be thinking about the finished product sort of from back-front as well as front-back, of course is always carried through with my designs, and what I learnt in Tassie just highlights that, and heightens it. Um, I was already aware of that before I was there, in that respect, but again there's I don't think that.....it's all meant in my design process, but as yet I don't think I've had the opportunities to carry it through to its full yet. But I'm looking forward to that opportunity when I start working.
Interviewer	Great. Now, in the same sort of context, we've probably touched on it a bit in your response then. But do you think your attitude to architecture has been influenced by this experience down here?
Student 2	Yes it has been reinforced that architecture for me is about building.
Interviewer	OK. Given what you've reconstructed in these interviews that we've been doing, where do you see yourself going in the future with your design process once you're out in the workforce?
Student 2	XXXXXXX process, or design or architecture in general?
Interviewer	Ah, let's start with the design process, and then let's move onto architecture in a second statement. Do you see your design process.....um, can you foresee how it's going to evolve, because you said that just recently that, once you get into practice, you can see a few more elements of building, and mocking-up might be a part of your design process. Is that right in what I'm thinking?
Student 2	Yes. I hope so. I hope that I'm able to try and practice where that is something that

	they.....one of the ways that they work. Where I work at the moment – we tend not to work it that way, we're dealing with much more standard buildings, and therefore standard details and much of the experimental nature actually putting things together to see how they work isn't necessary. So I'm hoping to work in a practice which is you know, a bit more unique in each individual's design because that's what excites me.
Interviewer	Have you, by any chance, come across any firms like that, or know of any that would be good for experiences like that?
Student 2	Um, of course, you know that all the amazing international firms – I'm not sure how good they would be to work for as a young student, because you might end up being stuck behind a XXXX machine. But of course, the experience of being around those sort of people would be great. Obviously, an office like XXXX where they are continuously building models, and mocking things up. A lot of the high-tech architecture are doing that sort of work as well. In Australia, um, there's quite a few who are dealing with that sort of craft of architecture. Um, John Wardle is one, in Melbourne, XXXXX they do another....a lot of experimental, particularly with design work and patterns, and 2D plane a lot more than 3D. And, um, I have a very weak understanding of this, so what I'm saying is probably slightly untruths, and XXXXXXXX like the way they put buildings together.
Interviewer	OK. And onto the second point, of where do you see yourself going in the future with architecture?
Student 2	I really don't know. I know what I'm interested in, and I'll be having a big think this Christmas after I've finished my degree. At that time, with a bit of luck, good fortune and opportunity I think will show me the way. So I think XXXXX 50% of maybe where I'm going is self-guided, the other 50% is XXXX opportunity.
Interviewer	I gather from what you're saying though, that you're still really inspired and keen to get out there and actually do some architecture.
Student 2	Yes. I really want to build.
Interviewer	Have something built? Is that what you mean by that statement?
Student 2	Yes. Yes. Not just something XXXXXXX
Interviewer	Something good?
Student 2	Something good, of course. Everything you are to do would be good, but ideally, I would like to get involved next, my next step phase would be to begin searching for a firm or a person who I really admire and work up to them, like a mentor for me, to continue to inspire me, and sort of help develop and fine-tune my philosophies and beliefs and then ideally within 5-10 years, I would like to begin my own practice. So I could have a lot more authority, responsibility and control for what's being done. But again, like those things require clients, which requires sort of luck, various other things, and of course the act of building becomes more than the act of designing because there's politics, and there's business practices, and, etc, etc.
Interviewer	OK. In your second interview, I'm partially through that at the moment, but I was looking at you were describing to me that in the last interview, that you actually used both models and drawing in your design process.
Student 2	Yes.
Interviewer	Um, can you describe a bit more for me, your design process?
Student 2	At the moment?
Interviewer	Yep.
Student 2	It depends a great deal on what I'm designing, but.....
Interviewer	There's no overriding themes, or strategies that you employ?
Student 2	I usually look at things in case-specific, and then may, if I analyse it more, I might see some underlying current, which I'm aware of that is sub-conscious. I know there are certain philosophies which I believe in that I like to continue through when I'm designing buildings but I wouldn't necessarily take those same principles of say, designing a stage-set because they have different, um, outcomes, like with those things I was talking about – sort of environmental principles of natural life, natural vegetation, um, respect for materials – those sort of issues, or a sort of underlying everything I'm thinking about, hopefully. But often I'll take site that plays a strong influence on that process, so I do a strong site analysis and work out what potential and constraints that the site has. Um, the program is one that I'm fairly grounded in – the functional nature of architecture, and serving a purpose on the commodity side of the trio. And then, then after I've sort of dealt with those sort of issues, and grappled at the idea of what I'm trying to create, what sort of space, I work out what sort of

	place I'm trying to make – how it would feel. And like, usually XXXXX over a period of time, like I start with a broad concept, and sort of which may deal with the urban idea, and then maybe another broad concept which deals with the functional concept, and then another sort of broad idea, which deals with that, and then slowly like I create a series of layers, and where they intersect is where you start to get pieces of architecture.
Interviewer	So, are your ideas generated from many different areas, depending on what looks like a good idea, or inspirational in the sense, ah, sometimes are you influenced particularly by a site, or sometimes are you particularly influenced by a theoretical position you're taking? Or um, in that case when you talk about idea, where is that usually generated from?
Student 2	The idea.....yes all those things you were talking about: site, function, ah, environmental, control, and also theory – environmental theory, psychology, that sort of basic broad issues that I try to look at, I mean I tend to look at each one independently, and create the sort of best, most ideal situation to that particular aspect and when you run across, you know, lots and lots of these various aspects, then you have to, you have to sort of work out where you have contrasts, and similarities in the actual form that you've been derived from this particular principle and by massaging backwards and forwards you end up with a compromise has negative connotations. But it's a compromise that's a line-of-best-fit.
Interviewer	So, physically, through drawing, diagramming, um, things like that – those sort of tools, what would you say that you um, how do you organise these competing and conflicting different ideas, um, to make assessments of them as such?
Student 2	Well obviously, I suppose I have to prioritise when there is a strong conflict of two ideas that are mutually exclusive. Then I have to consider which is the most important of those, and which one will have more sway on the other idea. I think, ideally, the belief is, that if you keep working at it long enough you will find a solution that pleases everybody, but in reality that may not be true, and certainly in reality, there's never enough time to do that. In the bigger reality, the sheer cost of a lot of solutions becomes a strong constraint, and therefore, you don't really have any choice, it's not a matter of prioritising, it's just a matter of what you can and can't afford. At university, we have the, usually have the privilege of having no budget, and no-one really checking that, and it's not going to be built anyway, so no-one really.....is concerned too much. So that, that parameter is often brought away. Also, there's a client. Architecture tends to be a client-based service, and so their wishes help prioritise amongst those various aspects.
Interviewer	So, are you indicating that you appraise these issues and ideas throughout the process through perhaps looking at drawings, by diagramming, by um, discussing this with other colleagues, um, those sort of techniques?
Student 2	Discussion would probably be my favourite tool in appraising. I often get very close to a project and because I've, as I was saying before, I worked up sort of a best solution for each interrelation, and individual aspect, I find it very difficult sometimes to distance myself enough to see the wood from the trees, and work out what is really working out, and what's also important to work and what's a little bit of a red herring. So working with colleagues is very useful – I work at a studio at Uni, with a group of other people, and I'm continuously asking them "what do you think of this.....what do you think of that?" And I suppose, ideally, I'm hoping that one day I'll have enough experience in myself, that I don't need to ask other people what you think. But I'll have seen, and seen yes that works, but that doesn't work and I'll be able to prioritise and appraise a little bit more critically. So maybe that second person will be within myself, but I'm too young to do that yet.
Interviewer	OK. If we move on to now, the data – the graphs and the interpretation that I sent to you – if we have a look at that, if you want to pull that out. I don't know if that's close to you at the moment. OK. In your um, digestion so far, of this document that I've given you – what are your thoughts?
Student 2	Very rigorous, XXXXXXXXXX it looks very efficient, very.....well I know I was there, and I realised that the way that information you were taking down was often quite difficult with noise, and with people moving around, etc. The way you seem to have collated it looks very scientific.
Interviewer	Looks.....mmm. *laughs* I don't know if looks gets me there though. *Laughs* In the sense of when I start talking about describing yourself and your student team members, do you think that's a fair representation – saying that um, I've got written

	here that it was a small sample, that I thought that as a team, you guys represented a confident, um, you were confident and mature students, who exhibited strong leadership skills?
Student 2	Yes. No that was fair as a team. I don't think the group that, study was necessarily a cross-reference across the groups of people that were there.
Interviewer	I'd agree with that. I'd agree by accident – somehow I found a group that was highly experienced and probably at the top range of the students that were there. By accident.
Student 2	Well yes – sheer accident, sheer coincidence.
Interviewer	All I can say is the only form of conspiracy perhaps in it is Lecturer 2. But, I was none-the-wiser at that point in time. *Laughs*
Student 2	**Laughs**
Interviewer	Lecturer 2 just goes: "That looks like a good group," and I go, "Oh, OK," didn't think too deeply about what he/she said "They're having some interesting conversations," but um, of course, he/she knew far more than I did at that point in time. So, that's the only conspiracy I'd had till then. But, I'd say that I was unaware of it, so, I don't think that impacted on it, as such. Um……..
Student 2	XXXXXXXXX valid point
Interviewer	Yeah. Yeah.
Student 2	I don't think you need to have sort of a broader, broader range.
Interviewer	Well the idea was to get just a glimpse of what some students experienced, in a scholarly manner. Just to get an idea of the conversation, the way the content was going.
Student 2	I think it's very important. I agree entirely that this sort of workshop is very beneficial for education, and I wish that the university I was at had something similar to offer to its students. And they do try, but they seem to fall short a bit. So I think a study like this to probably begin academic terms and value in something like this can be very helpful XXXXXX these sorts of programs. Which obviously are potentially more expensive than traditional education……. Therefore harder to maintain with funding cuts.
Interviewer	Do you think your opinion's a bit, … is formed a bit by sentimentality of the joy of making something - that it's a fun environment, and, it's a completely different experience to what you've got so far?
Student 2	Partially, yes partially that would have something to do with it, of course, as a social being, as a human social being. But at the same time, just the level of learning that you get out of actually putting something together can't be achieved at 1:200, at drawing a schematic stage. It's another level of architecture, and I think if the idea of architecture is to build, which is what I believe it is, then we need to have more of this sort of program so that when we leave, we're not left in the XXXXXXX world. Which is you know, potentially why a lot of the public core architects into common wankers.
Interviewer	In your opinion…Oh God, 'wankers' just stick in my head now, thanks to you.
Student 2	*Laughs*. I did try to XXXXXX
Interviewer	*Laughs* Oh, God, in your opinion, do you think exercises like this, … what sort of feeling do they give you, to take out into the workforce, or take into university?
Student 2	What sort of a feeling?
Interviewer	Yeah. Do you think it assists you in any way?
Student 2	Does it – which area do you mean?
Interviewer	Um, doing this sort of work experience, actually building something that you design. Do you, um, does it give you feelings towards how you behave in an office, or anything like that from this experience?
Student 2	Probably, I think it would give you a bit more confidence, and particularly entering an office where as a graduate architect, very little experience on the built side of things, every bit of built work you do early on helps your confidence, and it's quite obvious I think, between people who have worked as builders and labourers, or people who've say come from a more rural setting, where they've been building fences and various things for a long time, you have a lot more confidence in just the way things go together.
Interviewer	Do you think it helped you in any way with your understanding of structure, of forces, and how things stand up?
Student 2	Um, I don't think it aided my understanding of how things stand up, it, maybe I learnt a bit about the internal structure of timber. Oh, and there were a few jointing

	techniques which I wasn't aware of, particularly um, with relation to putting holes in timber for bolts, and the various notchings, and the way that the grain splits from that notching. But not so much the basic principles of statics, no.
Interviewer	You've, now getting back to these interpretations that I have written, I believe that I have written, as yourself being student 2, that you demonstrated in your discussion of design issues at the beginning, a very dominant evaluative style, which I've told you previously, is an opinionated style. It's more about a gut-feeling – I like, I think……blah, blah, blah. Do you think that is an accurate um, assessment of perhaps your discussion at that point in time, if you can recall?
Student 2	I think, I believe……?
Interviewer	Yeah.
Student 2	Yes. That would be fair.
Interviewer	Um, I go further onto say, that it's my theory that once all three of you started building, that there was a different attitude, a different conversation appearing, because in my interpretation, I believe that because you'd had limited experience in that, that your ability to discuss it changed from something like as in design, I believe you probably had quite a few discussions about design issues, at university…….
Student 2	Yep.
Interviewer	……and I'm proposing that the actual building experience was new to you in your conversation techniques and how you were discussing things changed at that point. Is it possible for you to comment on that?
Student 2	Ah, it is possible XXXXXXX what you were saying sounds accurate, but at the same time, it was a long time ago, and I tend to, as we've already found out in these sorts of conversations, a lot of bits will drop away, and I remember highlights. So, I wouldn't be able to say anything with much authority or accuracy.
Interviewer	That's alright. I'm just scanning through what else I've given you to see if there's any more um, controversial pieces that I should ask your opinion……I think the only other piece that um, could be considered controversial in my interpretation was right at the bottom of it when I'm talking about group work.
Student 2	Um, yes.
Interviewer	Where I've suggested that perhaps, um, that finding ah, leadership roles or how the team operated together in the first few days probably had an influence on conversation – how it occurred, like the interpersonal style as such. Um, the diversity in how the conversations were running between the three of you, because they seemed to um, assimilate a lot more during the construction period, that that could just be because during construction there wasn't much to comment on and in design, you have more opinions or something like that, but um, I don't know. Do you think it was a fair assessment about…..?
Student 2	Between the three of us there was probably less of discussion and more assimilation in the latter period because I felt that we were, the three of us disbanded and became sort of involved in other things, other than the – when we first started, we were involved in sort of designing and discussing the roof element, which had other structural implications, and that's where the discussions came from. Towards the end, it is written here that student 1 moved into a more supportive role, I presume you're talking about the drafting of the actual design.
Interviewer	It's Student 1, yep.
Student 2	Yeah. And so he/she was obviously no longer sort of involved in that sort of discussion. Again, I think I left the roof fairly much to him/her, somehow. And went more to help the structural group, who seemed to not turn up as much, and disappear, and various other things. So the discussions between the three of us I think, in that sense, we became segmented.
Interviewer	That's probably a fair comment actually – that you um, sort of felt that everybody within your group was quite capable, and that there were probably some other issues that needed some assistance and you thought well, I'll go and help them, and Student 1 in the sense, had the computer skills to pull that off quickly and thought right, well I'll just do that…..
Student 2	Yep.
Interviewer	….and get that out of way, and let's keep going. Because you were wanted to be involved in the building process and make it successful.
Student 2	Yep. And I think that was again possibly coming from our group, XXXX being a little bit older than the others, just easier for us to sort of….you say there was no need for dominant leadership became insignificant, I don't know if I'd necessarily agree

	with that. But maybe you're talking about dominant leadership with um the three of us. But I'd say we all took on a sort of sub-leader group within the large group.
Interviewer	Found it elsewhere?
Student 2	Yeah.
Interviewer	Instead of talking between yourselves?
Student 2	I think so. I think that's the way I see it, I don't know if that's fair, you know?
Interviewer	No, that's probably, probably um, another very good version of it. I guess I was interpreting with particularly Student 3, that when he/she disappeared for that weekend, and he/she came back, he/she just didn't have, in a very colloquial term: legs to stand on in where the design had gone, and the decisions that had been made, which meant…
Student 2	Because he/she did distance himself/herself a bit in that weekend.
Interviewer	So I just felt from that point onwards, it was more of: OK, well the design's been accepted we've got past the pre-Madonna stage as such, now let's just build it and….
Student 2	Yep.
Interviewer	….people are more interested in building than getting hung up on who decided what.
Student 2	Yep.
Interviewer	Which is an interesting um, that people hold the design process quite preciously, whereas other people may not hold the construction of oh, I built that bit, or look at the beautiful craftsmanship that I did as much. But um, I guess that's just the beast that it is.
Student 2	Yes. I'd agree with that, too. *Laugh*
Interviewer	I'm just looking if there's anything else here that I've said that I'd love your opinion on. Do you agree with my global statement that over the whole process, that you actually considered design and detail issues concurrently?
Student 2	Where's the global statement?
Interviewer	It's right at the bottom. It says 'Despite the small sample, these findings suggest that these mature and confident students did discuss and consider design and detail issues concurrently.'
Student 2	Yes.
Interviewer	It's bit of a loaded question though, isn't it? You wouldn't exactly say no, would you?
Student 2	I would've if I disagreed. *Laughs* I mean it's a fairly flattering statement, I think I'd agree with that.
Interviewer	*Laughs* That's what I mean, it's a bit hard for you to say no, isn't it?
Student 2	It is hard for me to say no. Well, I suppose I don't want to say no, if that makes sense, but I do agree with it.
Interviewer	So in your previous experiences of things you've done, I know you've said that most of the time it's been…

Appendix 6.11 Transcribed Interviews with Lecturer 1

First interview with Lecturer 1
Time duration: 1 hour

Interviewer	So the first question to ask you is how did you come about studying architecture?
Lecturer 1	Um, well I've always been interested in fine arts and um, I studied fine arts in Hobart for a year, um, I felt that it was not maybe technically challenging enough, and then discovered architecture in the same faculty, in the same building, and um, I thought I'd try it for a year, and um, then found I was really interested in it, and went from there. Um, I'd also been very interested in it as a child too I suppose, I used to always dream up my future house. Um, and I always had visions of designing and building my own house, even though I wasn't going to be an architect, when I was at matriculation or high school. Yeah, I went on, straight from matriculation. Um, I didn't spend time out in the industry or anything like that before I started. Yeah, but as soon as I started I found that I really enjoyed it. And that, that was what I really wanted to do. I was addicted, I suppose, to architecture, like people do.
Interviewer	Did you have any contacts with architects when you were growing up, or anyone within that sort of profession?
Lecturer 1	No, not at all. Um, there's no good architects in our family and extended family. Um, there's the odd builder, but I wouldn't have ever seen them as role models because they were more step building type builders. Um, they weren't involved in building architect-designed houses. Um, I've always been really interested in making, so I've made things from dot basically. *(laughs)* I used to see my Christmas list as a challenge to make everyone a present, whether it was something in the workshop *(laughs)* or, usually it was something in the workshop. Um, so, yeah I suppose that's..... and my father is a big 'maker'. Um, he did build our own house and um, he's built just about everything under the sun: from boats to just high-tech silk-screen printing presses. XXXXXX and all sorts of unusual things. But I suppose that might have influence me in making a decision towards the, um, a profession that involves making, I suppose. But like I said, I was interested initially in um, in art, in fine art, in 2-dimensional art, it wasn't even sculpture which I was particularly interested in. Um, oil-painting was my specialty area, but yeah, I suppose oil painting is a lot about 3-dimensional sort of analysis, too, and 3-dimensional um, sort of thinking because you're drawing, you're constructing things in perspective and um, constructing compositions, which I think architecture is a lot about – arranging objects in the picture frame, which is like arranging objects in 3-dimensional space in architecture, so..... there are those similarities. But, if, influence-wise, there was no architects, or no real people in the profession, directing me into the profession.
Interviewer	So did you help your dad build part of the house, or build little bits around the house?
Lecturer 1	Um, well our house is made, the house was built really before, I was, I mean, I am the last in the family, so there's 10 years between the eldest and the youngest, and the house was built 10 years before I was born, basically. And extensions happened afterwards, but they happened after I'd started architecture. Um, and I did help with those. Um, after I started architecture I started doing a lot of building projects with Dad around the house, because I'd come home with ideas, and want to modify his house. *(laughs)* So you know, barbeques, extensions and things like that, and decks we built together. Um, but that was post-architecture. Um, yeah, um they were always sort of more, smaller than the scale projects, like making things to hang on the wall or making jewellery boxes, or making letter boxes, you know beautiful little kids projects. I had my Emma's supply of making books, which I used to always look through to find something to make, and they'd have the odd building little project in them. We used to do those, too. Um.....
Interviewer	Um, did your closest sister to you used to join in with the XXXXX as well?
Lecturer 1	Um, being the youngest I was, um, and, well my eldest, my eldest sister was 10 years older, then the one above me was three years older, so she left for University

	when she was 16. So, I was only 13 at that stage. So we didn't, by making I suppose my biggest making phase would've been between, you know, like after 10 onwards. So making projects were really individual making projects. So, and possibly worth a fright *(laughs)*. My sisters too, um, I don't, they weren't really, I didn't really work with my sisters on my making activities. More-so with my mum and my dad. Like I would get assistance from mum if I was doing something that was, you know like, um, what's a good example of this: like making a flower press. *(laughs)* or something like that, mum would help me. Um, yeah, it was um, yeah, making a billy-cart or whatever, dad would assist. Um, yeah.
Interviewer	How did you come to be involved when you were at University of Tasmania with the learning-by-making studios?
Lecturer 1	Um, well they started um, we started, um, constructing, we started on the learning-by-making studios, possibly a year after I started teaching at the University. And, um, my biggest frustration with the course as I went through as a student, was that it didn't involve any making. And, um, as a student, we tried to facilitate our own making projects. Like, um I remember a BT project where we constructed some details. Um, and that was through, um, the students rallying to have that realised. And, so when I became a teacher, I thought it was really important to um, give students that opportunity to design and realize something. So, um, the first one was the Tamar Island project. And, um, that one came about through, we had Robin on board at the University when the workshop was set up um, and um, I had some contacts with National Parks, so I sourced the appropriate um, with National Parks, I don't think they quite believed they were going to get a building, but they did, for nothing. Um, yeah, so we just jumped in the deep end basically. Um, yeah, so my involvement, I suppose comes from, you know what I thought was a lacking in the course.
Interviewer	So was that as a specialized studio, or was it part of one of the design studios?
Lecturer 1	It was part of the first year program because, um, I was teaching first year, with Lecturer 2, and um, yeah, it was just incorporated into the program. Prior to that, we had done some smaller, sort of making projects, um with the students, such as like making set-squares, and XXXXX squares, and drawing from palettes, and the like to set them for a semester. But um, yeah, that was the first real building. But like I said, it was a real jump in the deep end approach, it wasn't um, it didn't sort of build up to a learning-by-making program, it just happened, out of the blue, because the circumstances were right. And, um, a group of people were passionate about doing a building project.
Interviewer	So it was a sort of team conspiracy thing where just, Robin, and yourself, and Anne-Marie just having one of these conversations, and decided well, let's do it?
Lecturer 1	Yes. Well there had been more than the simple drawing palettes, they had done a little, they had done Robin's shed previously, and um, that was done with the, I can't remember which year that was done with, I think it might have been first years again. Um, but then there was um, sort of, that was um, sort of like the first warm-up experiment I suppose, um, yeah, just thinking. Um, whereas the Tamar Island one was the first community driven project, where a real client was involved, and there were the real pressures of realizing something that the students would be um, proud of in the community, and not a project that would be, you know, hiding on campus, on sort of 'safe territory'. Um, and yeah. I've forgotten where we started on that question..... *(laughs)*
Interviewer	That's OK, I was just asking how you were involved in, how did you come to be involved in learning-by-making. We were really discussing at the start I guess, it would've been 1994 or 1995. That would've been around that. Because I think Robin's shed was 1994.....
Lecturer 1	Yep.
Interviewer	.....so Tamar must have been 1995, so in 1994 when they were doing Robin's shed, what were you doing then?
Lecturer 1	I was um, completing my masters still at that point. And, um, yeah I hadn't started, well, I hadn't directly, apart from tutoring, I hadn't started working full-time for the University, I was still tutoring at that stage, in a couple of subjects. And I did my XXXXX masters. *(laughs)* A very self-focused masters.
Interviewer	So when you took on this building project as part of the first year design when you first started teaching did that daunt you, or was it just an experiment to give it a whirl, like have you done something similar to that before? Like built a little

	pavilion or a little XXXX something?
Lecturer 1	No. *(laughs)* No, not really. But um, well I enjoy just jumping in the deep end *(laughs)* That's my personality. I mean that even though it was for the community – they weren't paying for it so um, we didn't feel like, if it was a disaster it wouldn't have been um, installed on site, so there was always that safety net. But, of course, it was never going to be a disaster, because the students given the opportunity become passionate about something like that, they see it's an exciting opportunity to get their first building realised. And um, so they put so much time and effort into it, that you're guaranteed a success. Um, you know, I suppose for our own psychological *(laughs)* well-being we sort of thought well if it wasn't going to work it wouldn't go out on site. And like I said before, the clients, I don't think they really believed they were getting a real building for nothing. A little XXXXXXX for nothing. Um, until it happened, until it was there. And it went up very quickly, like it was there put on site over a day and a half I think, that one, it was a very short time-span. Um, mmmm it was a really convenient building location too, it was it just had this timber, this very thick timber deck a um, deck of 32mm thick decking which we could just bolt everything down onto. So the process was very simple. It didn't involve fittings and all those other sorts of things that can leave a mess on the side if it's not going to plan.
Interviewer	Did it clearly come about that it was team-based little components of the design or did that just come about because of the physical numbers of students you had in the class and how you organised that students worked in teams and they had the component of the design to look at?
Lecturer 1	Yeah. Well the project, to get everyone involved, everyone who was like they need to be responsible for some part. Um, and instead of we're designing a building, and it seems like a singular task, then instead of saying we're designing a roof, a wall, a something to sit on, we're designing a you know, a viewing deck, they all become separate design exercises, and give everyone the opportunity to add their own ideas into the components, and then well to test their own ideas, and then to bring them together and um, you know assess which one's are the most appropriate for the project. So it does, it's a more conclusive way to produce a building than to set it up as a complete object, um, as a building you know, a visitor, a gateway for example with the Tamar Island building.
Interviewer	Would you say it came by accident and good-fortune in that initially it was a management, and then through experience of building projects you guys saw these added advantages, or was it....?
Lecturer 1	No I think it was conscious, because where do you start if you've got 35 students and you tell these 35 students you've got a building to design then you're setting yourself up for a process of competition, and we were very conscious, we didn't want to do a design competition style um, learning-by-making process, where one scheme gets selected and then everyone builds the scheme. The winning scheme. Because then everyone's ideas aren't tested, and um, I think the important thing about building by making is that people think of an idea, they try to realize it in a built form and then build it, um, and for everyone to have that experience, you need to divide the tasks. Um, I know that everyone's initial idea isn't realised in the final building, um, but that's very similar to a process of architecture anyway: ideas that sort of reshape as you progress through the design stages. Um, and an initial idea may not be the final thing that's actually built in solid timber on site. Um, yeah I mean it was I think it was more conscious, I don't think we ever really thought oh wow, this is, this is, I mean we did realize in the end that there were some other wonderful benefits that were happening in the process. The first one um, also the green gateway and having two decks, we did already automatically have the opportunity for two buildings. Um, and then I suppose we broke it down into, not wanting to be too specific with the brief, because the client wasn't specific with a brief, we thought well what of the basic concepts of a building, and shelter is one. So, what's shelter, well potentially a zone up in the air. A roof plane, although we avoided calling it a roof. Um, and this object had to be like a duck hive and frame views, and so you know, we gave another group a framing approach, you know. And of course, what's a part of architecture? Structure. And so that divides off. So, I suppose that divides architecture down into the splitting up of the project divides architecture down into some of its basic um, principles. And it gives the students the opportunity to think about you know, those basic principles, such as structural

	support, or shelter or, um shade, or comfort in seating and those sorts of things.
Interviewer	In the case of a lot of the projects we've done with the younger students, that occurs sort of in first year, and then sort of developed into specialized studios for second and third year, um, my impression is that's just come about because where you guys were actually positioned within the school, and you could do those sorts of things. But what's your opinion, um, what do you think it's placed at the beginning of the course, or do you think it has advantages, or perhaps, senior students to be doing it?
Lecturer 1	Well um, like, with the first question, the previous question you asked, whether that was by accident that we ended up with a wonderful process, I think, um, this question, we did by accident end up with it in the right spot. Um, being in first year anyway, I think students at that stage, um, have, because they haven't been exposed to so many theoretical individual projects, they're more willing to work as a team and as a group. Um, whereas, if a student hasn't done a building project um, and then does their first building project, in fourth year for example, um, they struggle because they feel architecture is a very individual pursuit by that stage. Um, they've done a series of hypothetical projects and more than likely as individuals rather than as group projects, XXXXX assessed as individuals, so the, you know, they've got a different view of what um, architecture is. And, their egos have been developed, well developed, um, and you can see that in the summer school projects, a little bit more of a struggle than a project with a group of fresh first-years, who are quite willing to accept that architecture can be a team process. Um, and also I suppose, at that stage, they're more open-minded potentially, and later in the course, though. I mean not, I'm not being critical of them, but I suppose they've developed their own ideas more, and they've become individual designers more, um, and they find it difficult coming in with a group of people with a series of individual, very individual impressions of what architecture should be. Um, rather than a young group of people who um, are still trying to grapple, find what architecture is for them. And are less passionate about defending their territory *(laughs)*. And yeah, so I think that if you've done a building project in your first year, I think another building project in a later year is a really good thing to do, because um, the first project, so much is happening, and I think detail tends to um, be skimmed over a little in their first building project. Whereas in a second year building project for example, a second building project for the same student, um, the students are more interested in the way materials come together. Um, you know, the way you can join a piece of steel to a piece of timber. Um, whereas in the first project, its mainly about trying to make a structure that doesn't wobble too much, and um, can result in the second project too, when the student get so fascinated in the detail, they forget the overall structure. Um, yeah. But um I think it's really valuable to do more than one um building project.
Interviewer	When you first started in some conversation I've had with yourself, and Lecturer 2, you always talk about the importance and the value of using models. From the start, was it always so model-based or was it a mixture between drawing and models in designing that actual project?
Lecturer 1	Um, it's always been model based, and I think that's also a part of trying to um, make the process a collective process, because a sketch-book, or a piece of paper and a pen is a very singular exercise, um, and something students are already familiar with, as a singular person exercise. Whereas a model is um, many people can stick parts onto a model, um, and it can be divided into components more readily, um, and everyone can view it, um, a larger crowd can view it and comment on it. Um, compared to say a small sketch in a sketch-book. I mean, no one draws large images, everyone draws tiny little sketches at the most, you can get two or three people involved in that process, whereas with a 1:10 model, you can get a whole class of 35 involved in the, in the commentary on the design. Um, so I think that's why the models are important over the drawing process, and we almost in the beginning I suppose, banned drawing from the process, just to stop students from heading down a singular path. Um, and bringing it back to the collective process as a model. Um, but as um the building program developed, I think we started to, well I know personally I tried to allow them to do more drawing. Um, particularly when they were in their smaller groups. As long as it was always referenced back to the model, I think it's important to do that. Yeah.
Interviewer	Just talking about the connection between models and drawings, in some of your building projects, you actually asked students to draw the product after it was built.

	Is that right?
Lecturer 1	Yep. I also thought that was very important, because otherwise the drawing is completely detached from the object and in future hypothetical projects in the studio, I felt it's important that they have um, reestablished that connection with what the studio based projects are about: producing a drawing, or producing an individual model. Um, and um, the learning-by-making fills that complete a real building, they've got a set of real details, and it's an insight into how you would then, if you redraw this detail, um, it gives you information of how you would present it to a builder in the future. So, um I'm not making that very clear, am I? So a, by redrawing it at the end, you've understood the detail: the 3-dimensional thing that you've created on all the levels basically: from the sketch that you did in your sketch-book initially, or the sketch models that you were producing, to the more refined models that you were producing to the real thing, and then you also know how to communicate it through a technical drawing so it was introducing the technical drawing back into it. And it was very important that it was afterwards and not during *(laughs)* Um, I don't think can't really happen during the process because the details aren't completed until the last moment really. And they're continually being modified, especially if something falls short of the detail – maybe its….. For example in the Missiondale building, there was seat detail, and it allowed the seat to twist, and a student added some beautiful almost caterpillar-like legs to the underside of the seat. Um, and that for example that idea wasn't thought of until it was actually made, and they realised the structural problems that it actually turned out to be a very seductive beautiful detail. Um, yeah and then in drawing that, they've then sort of completed the entire circle of what architecture's about: about designing, drawing and making and realizing buildings.
Interviewer	In that case, then, when you XXXXXX your building projects, what would you put the reason behind that um, perhaps in some of the later projects that I've seen with you, that the drawing wasn't at the end of the studio?
Lecturer 1	Um, I think um, a lot of the, the learning-by-making project sadly, has always had to fit into the way the school is organized. And um, I would say the ideal way to run a learning by making project is with a group of 35, whereas later we were forced to run them with a group of 60, just to give everyone a chance to participate and because the timing and, you know the inability to get students in one block of time. Um, I think also that's one of the best ways for it to be run: as a block rather than as a specialised studio, which is once a week, because I think a lot is learnt through the intensity of the program. And, um, as students are sitting there grappling with an issue for two hours for example, trying to work out how they're going to join one bit to another bit, and um, to see students sorting that out um that, in a program where they know they have to face it the next day is different than seeing someone think oh well, I'll think about it this week, and I'll worry about it next week. And it's harder to sustain the passion for the project, I think. And it's, I think students achieve a little less, in quantity, um of what they produce, not necessarily quality, because they're all pretty much striving to produce a fine product. And I think also that's why the drawing dropped off the end of the program, because, um, we couldn't really fit, I couldn't sustain the passion for the project, through to a drawing, whereas when the learning-by-making projects were run, um, at say an end of semester, and you could set the drawing as something to come in the portfolio. Um, they were seen as a necessary thing in the process. Um, whereas when they've got three other things to hand in at the same time, then they're mind's a little bit less focused um, and it was harder to get them to produce a drawing at the end of the program. Yeah, I really struggled with getting them to produce drawings especially at the end of the specialized studios um, compared to the other program. I feel XXXXXXXXX
Interviewer	Because I'm just thinking, on the Turner's Beach one, with the third years now when they were first year, did you guys think to do drawings of that, or was that just, XXXXXXX at the time?
Lecturer 1	I don't remember.
Interviewer	I can't recall either. Because for the first one, unfortunately you were away because……
Lecturer 1	Yes.
Interviewer	……your dad was sick for the second one.
Lecturer 1	Yeah the second one. Well the second one I was also taking a little bit less

	responsibility, I think, I think that one was initiated, the brief was written without me at that stage because I was still just coming back from my time away. So, I don't think I participated that much in the brief setting in that one. Um, I can't remember.
Interviewer	Do you recall Lecturer 2 ever having drawing as part of his/her submission.....?
Lecturer 1	I think everyone, um, I think the nice thing about the learning-by-making program is everyone does it quite differently. Everyone's got a different view of what learning-by-making is. Um, I don't think he's included the drawing as part of his/her programs.

Second interview occurred with Lecturer 1 a week after the first interview
Time duration: 1 hour

Interviewer	So if we start off with: what would you say your relationship was with the students, as a facilitator, or a lecturer, or being involved in it?
Lecturer 1	Well, ideally I believe your relationship should be an equal one. So, the lecturer, um, shouldn't be presenting themselves as someone with more knowledge. Obviously, there is some more knowledge that you do have, um, but you don't have to set yourself up in a hierarchical position as someone above the students, you'll try to work with the students. Um, so yeah, hopefully it was on a reasonably equal level. Um, particularly when it comes to talking about design. Because I believe the students have as good as ideas as the lecturers on design. And their ideas need as much respect as, as um anyone else with even more experience, for example in the area of design. Um, with making, um, maybe you do have a little bit more insight into realizing how to realize their ideas. Um, but then I always like referencing a lot of the making um, decisions onto Robin. So there is a little bit more of a clear, um, a clear sort of structure of who you go to for what sort of questions. Particularly seeing as Robin is the workshop manager, so it puts him in a position of authority in that area. Um, yeah so obviously XXXXX, hopefully
Interviewer	And how does that operate, what would've relationship would you say that you have with your um, lecturer, Lecturer 2, and Robin, the workshop manager.
Lecturer 1	Well, that's a team type relationship. Um, so we see ourselves as also equals in this process. Um, and I suppose offering different, different skills to the program, um, also um, just um, apart from offering different sort of working as a team to ensure the success of the project. So as motivators for the students, um, ah, as yeah, design motivators. Yeah..... I'm struggling this morning (laughs) as you can hear. Um, yeah I suppose, um, and keeping all the students happy, on a, you know, not just on um, a, it's more of a psychological level. So making sure students aren't getting overridden by other students. Keeping it a happy family um, setting. Yeah, so keeping an eye on whether there's any problems going on within the groups as well. Yeah. So mediators, I suppose is another word that comes to mind.
Interviewer	Now, can you remember, particularly the three students that I was studying that were in your group, the Pizza Hut group: Student 2, Student 3, and Student 1? Can you give me a description to begin with, Student 2, what sort of student, or what your sort of experiences were with Student 2?
Lecturer 1	Um, highly motivated, um, and had very high expectations of the program and they worked a little bit to his detriment. Um, he did have a little bit of a singular vision about design, he struggled with the idea that design could be achieved through many minds, and saw more as a bit of an individual process. But he was very, he really wanted to try, and I think he got over that hurdle about halfway through the process. Um, initially he started off trying to design the whole building given XXXXXXX to design a whole building. Because he sort of said architecture's holistic, um, so to be able to accept architecture as a series of components and trust in the process took him a while. Um, yeah, whereas – do you want me to go onto the others?
Interviewer	Yeah.
Lecturer 1	Whereas Student 1, for example, was far more ready to accept the process. Um, he um, as you know, has trust in the process and as not necessarily seeing architecture as a single, a single idea. Um, and XXXXXX, the boy/girl?
Interviewer	Student 3.
Lecturer 1	Student 3. Student 3. I don't know why, but I keep calling him/her Robin, because he/he/she reminds me of a previous student. Um, yeah, Student 3 was a little bit more like Student 2, but um, towards the end he/he/she particularly got really excited about

	a small component – the gutters that he/she was working on, and seeing those being made in town. And um, being in charge of just that part, and realizing it was a bit of a thrill for him/her. In the end, I think that's what the, that's what the whole process is really about. So, I mean architecture is holistic, but the final result has to be made of components and students find a component that they get passionate about and actually look towards achieving that and coming up with nice little ideas to achieve it. That's, that's when the whole thing really comes together. And it's, I consider successful at that point.
Interviewer	What would you say, how did they interact with the rest of the Pizza Hut group?
Lecturer 1	Well, they were leaders, they were, um, even though they may have been selected randomly, they were really strong personalities and um, well obviously, leaders in their courses, um, at respective universities. Um, they, um like I said, they all had a lot of enthusiasm for architecture. Um, and they were very nice people to work with, they also were listeners, um, so they were a particularly good bunch of students. But I mean, if I look back at the whole group, they were all of that, that style, type of student, and I think to come down and do a summer school – to pay the money, to get yourself organized – it all takes motivation. So you end up with automatically you end up with a highly-motivated group. Um, it's a bit different than when you select an entire year group and give them the same program because you're going to have different levels of motivation within that group. Um, whereas everyone, it was almost like too much passion at some points in the program. I mean, it brought out a lot of quite heated arguments where they were willing to debate something for a couple of hours. (laughs) To the point where they got very down-and-out without it, which was, um, I think probably the more difficult teaching challenge at that summer school was trying to keep everyone happy. Like I was saying before – an important role of a teacher is to be the mediator and keep everyone happy and feeling like they were getting rewards from the program. Um, but they were so ready to slip into architectural debate. Um, and of course, in an architectural debate, there is always a winner, and that's all very negative towards this collective design process where maybe they shouldn't be focusing so much on the design – they should just let that happen and they should be focusing on, on, um, you know what they are presently learning through you know, putting bits-and-pieces of materials together, and what they're learning through the doing process, rather than through the theorizing process. Because theory can always be extracted from a design afterwards, and you know, some of it's just spontaneous, some of it happens, and then in reflection, you say look how wonderful this is, and it's so much *like* something. I know they kept trying to make their building like a tree, and um, whereas often when you just let go of these really dominating concepts, they appear anyway. And I think they did – some of the textures, and some of the manipulation of light in the building was like sort of the dappled light under a tree, for example. Um, that's something that Student 2 was really struggling with initially. He had that strong concept, and that everyone should abide by it, like a rule book – to keep the design um, holistic. But, um it did get thrown out and still you look at the design and it looks like a holistic piece of architecture, it doesn't look like a disjointed collection of components.
Interviewer	That was actually, I was wondering what you XXXXX because my next question was can you recall some of the memorable teaching experiences that you had during the process? What events or experiences stick in your mind in that 14 day XXXXXXX?
Lecturer 1	Um, because they were really trying to achieve the best they possibly could, there were a lot of points where they threw away a design that I felt was almost getting there. Um, there were probably four points in the process, where if they were ready to take the next step of resolution, they could've produced a building, and each one would've been as good as the next. But they found it really difficult to jump from the design process into the making process. And I think that's part of their previous training, because they have only previously been in the design phase of architecture – in a hypothetical teaching program, you're producing a design, getting it critiqued, and then you move on to the next project. But getting them to jump into the point where they felt they could leave the design and move on to making was really difficult to get over that hurdle. Um, I suppose I felt: OK here we start again, and they'd throw everything out and start again. Um, and then produce another design. And, of course, every design can be criticized if you present it to 30 people, um, so it's never going to be perfect at the design phase, um, and they wanted it to be perfect, so they couldn't, they found it really difficult to go into making, and they had

	to leave it to the last minute, basically. And that's often the case in the learning-by-making program, and I think that's by the speed of the program is really important because it forces people to move on to the next stage. And of course in the next stage, a lot of design refinement occurs – in the making stage, and they, because they haven't had that experience, they believe the design has to be finalized in the design phase. Um, so that was memorable. *(Laughs)* So there was the large debates. And then, because they started to lose confidence, they'd bring in another person, and another opinion, and um, then that opinion of course would be based on criticism, rather than on a complementary approach to debating architecture. So someone would come in and say, you know – this is wonderful, this is wonderful, but this is where I believe, you know, something needs to be worked on. And, um, instead of cutting short of that criticism point, and instilling more confidence in the students to push it further. Um, and I think during the program, the few less experienced people in the way the process works were involved so um, that also caused a bit of a disruption. But I think no learning-by-making program is smooth sailing either, so you know – pointing out the negatives *(laughs)* ....the few negative experiences that I don't know any program that we've had without some sort of hiccup like that in it.
Interviewer	In the past, I think it was either yourself or Lecturer 2 has said that sometimes the summer schools are a bit more challenging to handle, with those students who have had a bit more experience in tasks.
Lecturer 1	Yeah, I suppose this is like what we were discussing yesterday, is that, I think unless you've had the learning-by-making experience in am early part of the course, um, and unless you can then really appreciate what a collective..... what can happen when you work in a collective situation – and that's in respect to design, um, then you basically, as a fourth year student, you've only had these experiences which are individually orientated *laughs* and to jump into something where you have to trust lots of fellow-students to come up with just as good-a-ideas. *Laughs* I mean architecture in schools um, is often very competitive, and this is about throwing away the competitive side of design. Um, and that's not easy to do after you haven't had that experience, or haven't had positive experiences in a non-competitive environment. Um, yeah.
Interviewer	Is there any other..... um, can you think of a positive memory that sticks in your mind?
Lecturer 1	Oh, just um, particularly when the building went onto the site and um, I could just see everyone feeling so relieved that it was such a wonderful building on site and um, just appreciating all the other components that maybe they didn't have such a direct responsibility for. And, um, another real highlight was when they did actually get over that um, sort of stagnation on the design stage and um, started making, and particularly Student 2 coming up to me and saying 'Oh, you know, I can't believe we spent so much time debating this design,' Um, I thought that was really wonderful. Um, and because he was detailing the ends of the rafters and he was getting really excited about what he could do with the ends of the rafters. And, of course, design was being applied in that situation. And then he was also designing and changing his mind, because all-of-a-sudden he realised the grain of the timber wouldn't work in some of the types of notches he was cutting. *(laughs)* Things were going to chip and break off, because it was sort of an unwise way to use a piece of timber. Um, yeah so all those sorts of things – I particularly find that high – when students start making, and start designing and making. Um, and the initial bit too, where you can just sense so much um, excitement for the program. Um, yeah the design stage is the hard stage, so that the first stage is a real high when everyone's just starting just modeling and throwing bits-and-pieces of materials together, and it's hard work, um, because then it's really debate um, between designs, and then when they get into the making it's a real high. And then when it's finally on the site, of course, it is again, because they can walk away or they can step back and look at their building that they've created. And um, not one building program has people stood back and criticized it – they've all been really happy at the end result. Um, so that's what puts such, um, puts such confidence into the teachers, I suppose, in the program, because you just know that every time it's going to work out a success XXXXXXX *(laughs)* you just have to trust the process and trust the enthusiasm and commitment of the students to achieve something they'll be proud of, and yeah, the result is always positive there.
Interviewer	How would you say that the students that I was particularly following – Student 2, Nick and Student 3 – they were quite enthusiastic and willing to give things a go.

	How did you manage or how did you assist students that weren't so confident and perhaps less experienced?
Lecturer 1	Um, yeah well in some ways sometimes it is easier to assist the people with less confidence, but sometimes people with more confidence are bluffing a lot about what they know and what they don't know. Um, whereas I suppose, a less confident student can assist by just working with them. But most students, we found most students in the summer school, um, hadn't really had a making experience, so all of them we've had to work with, we've had to get the XXXXXX out and cut pieces of wood with them, and instead of saying 'now you go and cut that,' I mean that's, that's the um obvious situation where you end up someone getting a bit lost with say, just order someone to do something without giving them the skills to do it. So, the confidence in making is just about grabbing the tool with them and doing one part and then getting them to do the next part and staying with them for you know three or four cuts, until you can see that it's just second-nature to them. Or then getting another student to train up, um, which then gives them more confidence, makes them, empowers them, makes them feel like um, they can now teach another person. Um, I think that's really important. Sometimes I'll collect two people initially, and then split them up into two, um, so basically go away and train another person – it's a quicker way *(laughs)*, and more efficient way to instill confidence in more people. Um, design – I think they all come into the course, um, particularly the summer schools with a fair bit of design confidence. Um, possibly um, more than enough *(laughs)*, and it's almost working in the opposite theme XXXXXX – trying to make people appreciate other people's ideas. Um, so sometimes you do that by, um, you know the scheme that's really dominant at the time just looking at other people's sketches or other people's little components and models and just putting them on the table and presenting them for them, because they might be, um, too scared to sort of um, be a dominant person in the design working group. So, um, yeah sometimes you take their model of a roof, and just chop of the other one and stick it on top, just so that at least their ideas would be brought into the center of the debate, and consider that sometimes they'd be stronger than the previous ideas. Yeah I suppose, it's just being sensitive to how people are working and picking up on who are the, who are the um, students lacking the confidence. But sometimes, I.... You know, once you've identified who's lacking confidence it's pretty easy to help and assist the situation but it's not overlooking those people to the point where, if you overlook them for too long, they might just retreat and just not participate at all, you know – not turn up to classes, or find other things to do for example. Um, and I think there was a little, there was an example of that in the um, in the summer school this year – there was two or three girls who sort of disappeared, and I think they got exhausted through the design debate phase. And it was very intense – I would....it was the most intense one that we've done *(laughs)*, um, the longest intense debate, I wouldn't say, like, the other last, the previous bus-stop had a very intense design phase, but it was shorter, and I just think it went to the point where it actually pushed these girls away. Um, so that, I mean with the.....we can't keep an eye on 15 people, I suppose, and sometimes that happens. It was very.....they did sort of come back into it a little bit in the end, but um, those two or three probably had a less positive experience.
Interviewer	In the case of, I think that was like Student 5 and a few of those who um, were in second year girls. But in the case I can recall um, good old Student 6 and Student 7 who were final year students, and I can remember that you had some difficulties sometimes or frustrations caused by those pair in getting them to actually put the seat together. How do you deal with strong personalities, or individuals that are fighting this concept of actually getting the tools and doing it?
Lecturer 1	I think it's almost fear, because they, they don't, they're scared of what might happen next. Or it can also be I say if it's fear, they're scared that they might discover something else that's wrong. Um, or if it's over-confidence they believe they're almost there and they haven't got much to do, and so they did a dawdle-around a little bit um, till you know, I'll just whip it up in the last half an hour. Um, so they don't actually understand the complexity of the task, with one instance they don't understand how much there really is to do, it might seem like a small amount, but usually it's a lot more um, than they understand – and that's due to a bit of a lack of experience in making. Um, or, yeah, or it's just fear of you know – this is the tenth time we've cut this bit, we don't want to stick it together – it's a denial *(laughs)*, um, approach where we don't really want to know if it goes together or not any more.

	Um, but I suppose to get people over that hurdle, you just go and assist. Um, but I do remember finding that fairly difficult because I assisted quite intensely, I felt like I was almost putting in every screw *(laughs)*, at one stage, um, I think we solved it in the end by finding another person. Actually, that's right - another person from another group came across who was quite willing to put it together, um, and possibly because he knew less about the project, it was, it was um more entertaining – I mean he knew less, and he was less fearful of what the outcome was going to be. And then as soon as he got involved, I think the others joined back in the process.
Interviewer	So, do you need to have time out, or how do you deal when you, when you're in this intense period of working that sometimes you are having conflicts or frustrations with certain individuals – how do you cope with that and not lose it, and keep helping everybody else?
Lecturer 1	Oh, you could never lose it. I think that would be a dreadful thing to do *(laughs)*, so um, yeah you just have to bide your time, or if it's getting to the point where you're getting frustrated, you walk away, or you swap, um, you swap with another lecturer and say 'look – I'm really struggling over here, would you go over and work with this group' and we didn't do it so much with this summer school, but with the previous summer school we did that a lot. So every now and then it was just so, you know, it would be much more healthy if we swapped at this point because I'm too close to what's going on, or I'm getting too frustrated and we need to, we need to get new people in different situations *(laughs)* um, so that's the best way. But I think at all costs you don't, you don't get frustrated with your students or try not to show that you're frustrated with your students. Because that can be really negative – if someone, if another student sees you're frustrated with a student, then they get frustrated with that student, and it puts a negative vibe into the program. Whereas you want everyone feeling positive about each other, not um, you don't want to put people on the outer in the program. So, although I'm certain on the odd occasion it might have happened *(laughs)* but, in the ideal world, you don't let that happen. But the students are willing enough to categorise other students, and um, they don't want to join in in that process at all.
Interviewer	So, what was your opinion – there were two external critiquers that came into the process, they weren't actually the clients, or weren't actually involved in the program what was your thoughts on their um, intervention into the process?
Lecturer 1	I think that actually extended the design phase of the program.
Interviewer	Yeah.
Lecturer 1	Um, he/he/she [Architect 1] was not introduced to what the program was about and approached it from very much a design-critique. Um, and made the students feel very unconfident about their work instead of confident. Um, whereas the other critquer, after seeing a few of the learning-by-making programs – um, critiqued the work in a completely different way that made the students feel fairly positive about their work. Um, so I think his critiquing wasn't negative, um, but I felt Architect 1 was negative, and um, I mean the students looked like they were about to cry at the end of that process. I mean, someone who just steps in from outside can't see or hasn't seen how much heartache the students have gone through, how many days of work and trauma to actually achieve something and it's just very harsh. *(laughs)* I think um, I think it really needs to be someone who's very sensitive if someone comes in from outside, or someone who understands what happens in the program. Um, and um, really understands how to critique in a positive light rather than in the negative light. Because critiquing in the positive light will quickly get rid of the negative components of design, um, quicker than actually identifying the negative components. Um, students are quite um, you know, they're very sensitive to someone discussing their work. So if you point out all the positive points, they're the points that are going to be improved upon um, whereas if you stand there and point out all the negative points, of course they're going to disappear, but they're going to disappear so rapidly that it'll take most of the other design with it. *(laughs)* Um, like if it's criticizing structure, if you pull out the structure, you don't have a building anymore. Um, whereas if you say you're talking about a positive point maybe being it's manipulation of light, for example, and you keep talking about that, the structure might resolve itself in between that, but it's got to stay there for a little while until it can be improved, um it can't just be axed instantly. And I think um, that that was one point that happened in the program where um, structure was being so heavily criticized that to pull it out, um, would've left no design at all. Um, and the light issue

	was being, um, was a positive issue, um, Architect 1 was discussing the blades that manipulated the light. Yeah, so um, I think that the person who's involved – the outside person needs to, needs to have some insight into the program, really. I think that's pretty vital. We've had Bud Brannigan involved and he's brilliant in that stage and he puts himself……I think the outside people need to also work on this one-to-one level, and see themselves as an equal. Um, whereas if they come into the program and see themselves as um, a person higher in the hierarchy of the program, it doesn't work. Um, whereas say, for example Bud will see himself as an equal when he comes in. Um, and, and actually when the engineers were involved, that was a wonderful experience, actually remembering, that sort of refers back to that previous question. The point where a group of people just got in and got involved and tried to resolve bits-and-pieces of the building, and um, they got the students all really excited again. They actually worked in the true direction of what the program's about – the design by making, and learning by making. Um, whereas um, a sit-down discussion *laughs*

Third interview occurred with Lecturer 1 a week after the second interview
Time duration: 1 hour

Interviewer	OK, so the um, the interview yesterday we were talking about actually the timber workshop. So if we talk about it in teaching experience, how would you say your um, teaching process may have evolved from the latest bus-stop project that you did? Has it changed? Do you think it has changed in any way from how you have been working previously?
Lecturer 1	Um, each um, process does add small little, little elements to the way you would approach the next one. Um, I think um, a fairly um, I suppose one point is really constraining the design phase. Um, like we were talking about yesterday and, and once again trying to get students to move with that quicker. Um, but I think we're always trying to do that, but um, if I think um maybe the students stayed in that phase a little bit too long, um, in this project. Um, and it always comes down to deadlines, I think, before students can move on to the next phase. They may be setting up another hurdle, which um, at an earlier point that was inflexible, like the end hurdle: finishing the building on-site is inflexible, setting up something a little bit earlier that was also inflexible, that forced the students to move on to building. Um, let me think – what other things? Um, I think also, um, maybe um, a type, a smaller group of people with more um, support – teaching support I felt were a bit thin on the ground. Um, for those projects. Um, so um, maybe, um, although we did have student assistance at that stage, but the second group didn't have that much student assistance, not 'til later on in the, in the program. And the student assistance was good, but um, and really didn't start to kick in, in value 'til later, um, but um, maybe just another, another full-time teaching staff member associated with each group, um, might be um, more valuable. Um, but um, I suppose it was quite good for the students themselves, too because they became, for tutored students because um, it was a confidence building exercise for them too. And possibly training them up for the future. Um, I think one of our elements, I think the brief was a really good brief for the students to work to, but I don't think there's any necessary changes to that. Um, and the scale of the project was the right scale. Um…..
Interviewer	I think you were saying yesterday that you enjoyed the input from the other students and XXXXXX
Lecturer 1	Yes. Yeah, that was a, that was a really exciting aspect. In another summer school situation, that would be a definite thing to include. Um, having a group of engineers and designers and architects work on the detail resolution, and present that to the students. Um, I also wouldn't change any of that and that would be a good thing to include in future projects. It may be more difficult to include in, say um, specialised studio which projects. Um, but in that sort of intense program it worked well. Um, what other aspects? Um, time-wise it was the right amount of time for the project. Um, yeah, I'm not, I'm seeming to be a little bit distant at this point….. *Laughs* ….to think about how to improve it. Maybe that sort of question's easier to answer just when you've just come out of the program, and well, just before you jump into another one, where you either have to sit and reflect um, how to, how to set up a new program.

Interviewer	Well, what would you hope that the students may have got from the workshop, that may have um, had an influence on their design process, and their attitude?
Lecturer 1	Um, oh well, hopefully they think about making in the process of designing after being involved in a project like that – they don't just think of design and not think about how you can realise a project – because that always affects design. Um, so hopefully they're thinking more holistically about, about architecture when they're picking up their pencils and scribbling in their sketchbooks. Um, also, um, hopefully they've just gained an insight into making and, and seen the potential of um, how ideas can come out of actually making rather than ideas coming out of um, build-theory for example. Um, and oh, I think that hopefully, you know, hopefully the process increases their passion for architecture and um, by giving them the whole picture. Um, by making them by making them be able to see a final result on site, they can then start really reassessing things. Um, such as reassessing, um, understanding the building's scale, for example a lot of the students don't understand um, building scale and size and all those sorts of issues until they've actually seen something 1:1. It's quite easy to draw a member a certain size and not really realise what it's going to be like in reality. Um, yeah so those sorts of points, but to touch, in touch with reality *laughs* um, and also then applying that to their future hypothetical work. And, yeah...
Interviewer	Where do you see the learning-by-making going in the future, as within the department? Where....where do you think it may go, or where do you think it should go?
Lecturer 1	Um, these are also difficult questions to answer *laughs* because I'm not really involved in the process anymore. Um, which is a bit disappointing *laughs*. Um, so I don't, I don't really have any control over it's direction. Um, oh hopefully it you know, continues to, I mean I'd hope for it to continue to exist and also for it to um, to be um community orientated. I think that's one thing I'm really protective of in the process. Um, because I feel like that's really important for students to actually speak with real clients, and to um, put their work out in the real world and feel like it has to be tested by other people. And particularly all that feedback that comes back to them over even a couple of years. For example, the Turner's Beach um, change-sheds – there's still feedback coming back on that project, and um, students are still dropping in and checking it out every now and then and seeing how the building is weathering in a public location, and those sorts of issues. Um, yeah, so hopefully it's still community based in the picture. Um, yeah, um, yeah I'd obviously like to have more input in *laughs* but um, yeah, just have to wait and see.
Interviewer	It's interesting, some of the students in their responses have said they find it difficult to apply their experiences in Tasmania to their um, design studios in their own universities. What do you think of that?
Lecturer 1	I suppose they, they may see a problem with scale. Um, because the buildings are of course all small-scale buildings, but um, I mean, I still believe the same principles apply *laugh* whatever scale the building is. Um, and even if it's just being more conscious of the way a bigger building is detailed after doing the small building which they have detailed. Um, and because often the student designing a larger building without any making experience, still sees it as a very broad sketch, without really realising that there's all details to consider: there's details everywhere to consider. Um, I mean they're fairly conscious of the staircase detail, because that's a fairly glamorous published *laugh* element of most buildings, but um, after doing a building, I think um, a lot of students became aware that every, every XXXXX becomes a detail. Um, even on the bigger scale building – well some do. So....and I think maybe um, the students who come down here to do the learning-by-making um, don't have the connective support in their studios, um, back at home. Like they don't have someone saying 'now, well this is sort of like what you were sort of doing in that building project,' for example, I know in second year, um, when teaching with Richard Blythe, um, and the students were designing some museums, for the railway yard, I remember taking a lot of connective conversations across between what those students had built in their learning-by-making and what they were designing for this gallery, which of course is the largest XXXXXXXXXXXXX. Um, yeah. And of course, um, these students wouldn't have people who've had, been involved in the process and XXXXX could make that connection. But they might see it as a fairly separate experience. And, but that uh, I think possibly that experiences of learning-by-making will become more valuable to them when they go out in the profession.

	Um, because um, they will have gained some skills in talking to clients, they will have gained, you know, some real-life experiences, um, that you know, seem fairly impressive to um, to you know, more directors etc, people in who have owned businesses and who can really influence students. Um, I've had feedback from students to suggest that um, that it very much impressed the people that they were looking for work with, and that they've had that experience.
Interviewer	Where do you see yourself going in the future with architecture, what sort of attitudes do you think you'll have?
Lecturer 1	*That's a nice broad question!* Um….
Interviewer	I think it's amazing that students XXXXX you.
Lecturer 1	*I know!* Oh, well um, I'm always gonna be involved in design-making and I suppose, um, even if it's designing making my own buildings. *Laughs* Um, or, or I really enjoy designing and then being involved really closely with the builder in the making phase. Um, I think architecture is such a broad thing, I'm hoping to do all sorts of things under it's umbrella *laughs*. So um, fairly hard to define exactly what, what yet – some further practice, and um, hopefully some more making, hopefully some more um, personal realisation of buildings, so some of my own building. Um, maybe some teaching, um, more teaching. Um, yeah. *Laughs*. I don't really know how to answer that one any more. Laughs it's a strange phase in my life to be asking that *question*.
Interviewer	They are strange questions.
Lecturer 1	**Laughs**
Interviewer	I forgot to ask you yesterday when I was interviewing you about someone describing your relationships in a social setting, and I forgot to ask you what your relationship with myself, as an interviewer and researcher in the timber workshop was like?
Lecturer 1	Oh, oh you were very unobtrusive in the program, *laughs*, as someone um, collecting information from the students. Um, it's good to have someone who's also um, really enjoys the process, um, recording it, and um, yeah. You know, I thought it was a positive thing, too, for the students as well as for us, because it puts um, a lot of what um, we are doing down on paper, and makes us become more conscious of um, of what are the positives and what are the negatives. I mean I loved the feedback, from um, what comes back from students – I mean it's a real key to how to, how to improve the process. Um, and it takes a lot of time and effort to do that and often people involved in the program – teaching don't have that time. *Laughs* I particularly enjoyed that feedback from the um from the wilderness suits. That was, that was really good to be able to look through and see how the students saw that program, and how they spent their time, and actually how I spent my time, too *laugh*. It was entertaining. Um, so, yeah.
Interviewer	OK, moving back onto the document that I showed you before…
Lecturer 1	Mmm.
Interviewer	…can you give me some of your comments on the analysis or interpretation of those events? I've interpreted them from my graph and my experiences of being there. How does it relate to your observations of those students while you were there? Do you think they're fair comments?
Lecturer 1	Um, yes it's that um looking through it seems that's the way the actual program went. Um, like even looking through um, the graph at the end of the document, um, just seeing how they swapped from a design focus to a making and an organisation focus. Um, and that reminded me how in the end basically all it seemed was organisation. *Laugh*. Um, and um, I don't, I remember at the end of the program I was doing a lot of that. My graph of that would be really heavily weighted um, towards um just 90% organisation in that last phase. Um, so I think that's a fairly true, true description of what happens in the process. Um.
Interviewer	With the natural um, interpretation I've made of the brief introduction between the three of them, and how after that I believe that the team formation between the three of them had an impact on XXXXXX. Particularly um, I felt there was an initial tussle between Ralph and Sonya, who had more of an opinion…
Lecturer 1	Mmm.
Interviewer	…and Michael was a lot more recessive, or less XXXXXX over the conflict, I don't know.
Lecturer 1	Yes.
Interviewer	That's the way I see it.
Lecturer 1	Oh, most definitely, um, Sonya and Ralph were *at each other's throats*. Um, a feeling like they wanted to win, but win the debate probably more importantly trying to win

	the debate than actually improve the design. And, um I think um, that, that in some ways…there's no real subject for it….subject one, um…
Interviewer	There was Ralph, and Michael and Sonya.
Lecturer 1	Michael. I think in some ways, Michael's responses are more um, just show more maturity, he wanted the program to work, so he found himself a position in which he could contribute. And um, not…I don't necessarily see that as recessive, because um, in most learning-by-making programs, the person who ends up um, putting down all the critical dimensions becomes a real key figure. They um, because they become the reference point for everyone. Like, because the only person who has all the dimensions in their head, for example. Um, so he might have, it's sort of almost like a wiser *laugh* than he…rather than a, a um, a sort of a back-stepping move I think he was still fairly dominant.
Interviewer	Yes, you could suggest that from Michael's background, out of the three, he's the one that works in the office, and he's been working in an office for five or six years. So his ability to work within teams, with different egos, or different opinions is probably a bit more diverse.
Lecturer 1	Lecturer 1reater, yeah, yes. I mean that, I think um, that intense debate is good, but it can also be really negative to the program. And I suppose, um, suppose the people that you struggle with the most in the learning-by-making program are people who try to dominate and um, instead of um, allowing you know everyone to contribute. I know, I know they also do try to allow everyone to contribute, because I can also remember moments where Ralph would step aside and say you know, "what do you guys think," but he still was finding it very difficult to let go of what he thought was the perfect outcome *laugh*. So, um yes, and there were moments where you know they were the two dominant figures would hijack another group of people, and take them aside and try to um, try to get another bigger body following them so they could come back to the debate with a stronger unit *in a stronger position. So a lot of gameplay – political gameplay was going on.* But then, I think in the end they did exhaust themselves, I mean it's a bit sad that they had to get to the point where they had to exhaust themselves before they could let go, and uh, and then really start to enjoy it. But I think that's what happened XXXX They um, they really battered round the design for a long time, but as soon as they did let go, I think both of them were fairly much enjoying it in the making stage.
Interviewer	Yes, it's interesting in my results, the responding style for XXXXXX XXXXXX, once they had started estimating materials, finding the tools….
Lecturer 1	Yeah.
Interviewer	…there was a lot of XXXXX challenges. It's a lot more across the board um, in different evaluative, interpretive, value-adding, probing, all those sort of things. But in the design phase, there seemed to be very, um very XXXXXX. It was almost only two things that dominated and that was from the start, they weren't using a variety of different techniques.
Lecturer 1	Yeah, referring back to you know, what's the biggest lesson that you hope that they get from the program is possibly that. But it's not always all about just paper-based design debate – but it's always about a lot more than that. Um, and I, it's really quite a sudden change when that happens, too, um, in every building project, it's just sort of like someone's flipped a coin and the whole thing changes. Um, and everyone's approach, like you say everyone's approach changes. And also, everyone's enjoyment levels really *laugh* rise significantly at that point, I think. There's a big sigh of relief when they feel like they can start making. *Laugh* Um, and how, you know, that it's unanimous that this is what they want to make. Yeah, and I suppose, that if talking also about how to improve the design process, how to improve the program, I should say, is I would really like to look at how to make that first phase less painful for students. Um, and although I don't know how to do that yet *laugh*, but….
Interviewer	Do you think it's because that's what they see themselves as – like that's architecture and they're going to be architects, so they take that a lot more personally and passionately than perhaps, building because they don't see themselves as much as builders?
Lecturer 1	As makers…I think um, it's, each learning-by-making program has sort of shown that that phase is more painful for an older student than a younger student. So it's almost like trying to break a mould of what they've got themselves into, and um so this is just referring back to what I was saying – I just, I don't know how you're going to

	actually change, I mean change, how to make it less painful *laugh* and how to make them trust you more that it'll all be fine in the end *laugh*. But um, yeah, I think the XXXX's important because it's yeah, it's quite traumatic seeing them right on the edge, *laugh*, I remember seeing Ralph at some points looking **so** down and out about the whole thing, and so frustrated. But I mean, maybe that's all part of learning too, really. But, *yes* maybe it's something they had to go through to actually realise that um, or now, hopefully realise in the future that it, it wasn't as precious, design wasn't as precious as they first thought it was.
Interviewer	Why do you think perhaps the um, student mentors weren't quite as involved as the Pizza Hut group? Do you have any thoughts on that?
Lecturer 1	Um, I think um, oh I sort of do –*laugh*- I'm being cautious here. I wasn't really involved in selecting them to come and work in the program, and they did know Ian a lot more than me. Um, you know, they were quite good friends with Ian, and I think they just felt more comfortable…
Interviewer	And they sort of wanted to play.
Lecturer 1	Yeah they wanted to play, and they also wanted to play together as a group, so they were hard to split up in two. Um, so and of course they were thrown in the deep end, too, so um maybe they were seeking a bit more security by staying together in one group. And um, I also think they, Ian's a bit more flamboyant and a louder character than they might've, you know they might've sort of felt was…
Interviewer	I don't know – what do you think of XXXXX I um, sort…I think that's a valid interpretation of it, but I also think the fact that there were a lot more older students actually in the Pizza Hut group. They were more fourth years, and final years and a few younger years. But there were a lot more, um, dominant personalities in your group. Like there was Student 5, there was Student 6, who was a final year. Then you have Student 1, Student 2 and Student 3 who were very competent at opinions as well, and um, there was a few other people as well, I can think of some guys from the University of Melbourne XXXXX wondering. Particularly like Tutor 1 and XXXXXXXXX XXXXXXX XXXXX a bit um….
Lecturer 1	Mmm.
Interviewer	Even though they had more building experience than most guys, they sort of backed off initially because…
Lecturer 1	Yeah maybe. I know um, in the end when they did start…..well when um when I approached Ian and Ian sent some of them over, *laugh*, and told them it was about time they came and helped the Pizza Hut group *[laugh]* they were, they were really good. I mean, and they didn't seem like, they didn't seem like they were lacking confidence around the strong personalities, so um, yeah. I think also, they started off being involved in the other group, so then they became attached to that design too, and whereas they didn't start off being involved in the um Pizza Hut group, and so it was harder then to come in, um, halfway through. Um, because yeah they got connected to the other project and were wanting to see that realised. So, yeah, I think that was possibly a stronger reason why they, it's just the way it worked out. Initially they were in one place, then they found it difficult to jump to another place, *[Laugh]* and a new context and a different building.
Interviewer	Well, I don't have any other questions to ask you unless you want to make a comment about XXXXXX to do with the project or the um questions I've been asking you.
Lecturer 1	No we can leave it at that *[laugh]*.
Interviewer	OK, XXXXXX

Appendix 6.12 Transcribed Interviews with Lecturer 2

First interview with Lecturer 2
Time duration: 1 hour

Interviewer	OK, so the first question I'm going to ask you is: how did you come to study architecture?
Lecturer 2	Ooh dear. How did I?..... Oh.... I selected it from a list of options with the University of Queensland. I really wanted to study art, but that wasn't possible. I was interested in architecture because I studied it in Grade 10, 11 and 12 at school and I thought yes, that's OK I'll give that a go.
Interviewer	OK, so did you have any contacts with architects as such, as a child or as a student as school?
Lecturer 2	Ah, not with architects, ah, you mean real human ones? (*Laugh)* I was reading lots of architecture books, etc at school, but no, I didn't know any architects, um, when I was a youngster. There was one architect that I knew of, and had met once or twice, and he was a friend of my uncle, but I didn't really get to know him until after I'd started university.
Interviewer	OK. So when you moved down to Tasmania, and you accepted a position down here as a lecturer, when would say your first conversation or interest developed in doing deigning by making, or getting students to make things as well as design them?
Lecturer 2	Um, gee that's interesting because as soon as I came down here I can remember looking into the possibilities of doing that style of project, because I had some, um very small things at the University of Queensland prior to that. Ah, but it was difficult, because the workshops were owned by education. The School of Architecture workshops were dismantled, prior to me coming down. Um, I did try to talk to the education school about using the workshops, but that was politically too difficult and it was just boring. Um, I suppose the real initiative in that was, um, it might have only six months after Robin Green arrived, and we built a workshop because I kept on pushing for it. And we got it. Robin arrived, and it was a conversation with Robin Green in the courtyard here. And we were, and Robin said to me "Hey, let's just build a little building," and I said "Yeah, let's do it!" *Laughs* And that's a long time ago, and that's Robin's shed. So the first thing would've been a conversation, ooh, six months before Robin's shed.
Interviewer	OK. Robin's shed..... 1994?
Lecturer 2	1994. OK. The only other, you mean, I mean I could talk about the stage-set designs.
Interviewer	Well, yes I was going to ask you because before Robin's shed.....
Lecturer 2	Oh, right, yeah.
Interviewer	There were a few other things....
Lecturer 2	Oh, there were lots of other things, but they weren't done on campus here.
Interviewer	OK.
Lecturer 2	Yeah, there was several projects before that, where we worked with a small group of students, sometimes 10, sometime 15, and we did this style of project, and I suppose, um, an important one to mention would be the XXXXX? Tree Farm, where we designed pavilions and we ended up making one of them. One of them was designed and made by a Lions Club, so we produced drawings for that one. Um, the workshop used for that one was a builder's workshop, Fairbrother's Builder's Company, where his head joiners worked to teach the students how to use equipment. And that was sort of a swapping arrangement, because I had done some consultancy work to get access to that workshop. Um, there's always been some small things done, where people have a go at making a chair or whatever, but that's common to all architecture schools, and you don't need a serious workshop to do that sort of thing. Ah, the interesting ones at the stage-set design ones where we would work from a box, a small box that would fit in the back of a car, and it had some very dodgy old power-tools and some basic old hand-tools. And we built stage-sets with this minimum amount of equipment, plus parts of the stage-set were of course made by TAFE college. Ah, such-and-such's Dad had a welder, so it was all clobbered together with connections with people in the community. And we were given use of an old wool store down by the river. And we'd use those rooms, huge rooms! Great fun! *Laughs*

Interviewer	What would you say instigated making you knew that you wanted to get students to make things as a design education policy?
Lecturer 2	Ah, I suppose that's a personal, ah experience viewpoint, because I've always made things myself. And, I can remember having difficulty working with students at say, UQ or even here, UT, talking about design, where the conversation would be about how something was made in design. And of course, I would always be speaking from some experience, and of course visual experience, and I could remember learning so much myself from literally working with material. There's something about feeling in action, and doing in action, which I think is fundamental to appreciating how things are made, and hence, how things are designed. I think the worst situation with design education is where designers are trained to assemble the look of something and then expect someone else to just try and reproduce that. Um, the classic, yeah the classic example of that is say, Jeff Coons, where he designs the fluffy puppy dog, or covered in flowers, but the resources involved in getting all the troop to do that, where he scours the world for professional expertise. And, yes he produces it, you know, he does it with ceramics and whatever, but that's high art. Um, I think designers produce better designs if they do appreciate and to some extent have experience in the making process. I think they can push the creative aspect with possibility with material way beyond the textbook situation. They become creative.
Interviewer	So maybe we're having these experiences of trying to discuss and explain the students at the University of Queensland, too. Was that with younger students or older students?
Lecturer 2	Right across the board – first to fifth. Common problem I can't say that it was first years..... It's.... yes, yes, it's common.
Interviewer	Because I was speaking to Lecturer 1 about how by accident, in my version, by accident, that we learn by making studios as such at the University of Tasmania, has involved younger students as such at the beginning of it. And my impression was um, the people that were enthusiastic about doing it just happened to be teaching those years, so those years got some experience....
Lecturer 2	That's correct. It had a lot to do with um, the people that were in a way allocated to teach first year, um, and also first year's are very particular. Not every staff member can teach first year. Lecturer 1's a great first year teacher, I've done a lot of it, and of course, we like working together, and it, we're interested in learning by making as an educational process. *Laughs* Of course, first years great to do it with because they're, they get such a buzz and a sense of achievement and enthusiasm for studying architecture by achieving their first thing one-to-one. So, mmm, that's just a consequence of synchronicity I think.
Interviewer	So, do you think um, learning by making personal progress likes to be positioned within the student's experience when they're studying architecture? Or do you think it's appropriate in any year?
Lecturer 2	Ah, I think it's essential to have a very early experience in sensing materials and learning by making. So, yes, I would always argue that yes, you must get first year students to have that experience because what it does it allows them then to even research or look at magazines or pictures, and there's a back-cloth from which they can appreciate things. You know, if they see a timber building, they immediately start to look at how things, well, how they go together, because they've had a go at it themselves. So, I think that's essential. Ah, I also believe that in education you need to be able to have time to repeat the exercise, and I mean the word exercise literally. The exercise of making and doing. If you can repeat that, you then get a chance to appreciate how skill can improve, intellectual inquiry on what materials can do can also advance. All of these things come from the exercise of repeated doing. I think, because of the way design, architecture courses are structured in a style, you know, I think it's really hard to get third years to do something, because there's this big push to get all this content crammed into their heads by the time they graduate with their first degree. Um, I've seen second year students benefit greatly from it and do a higher level of work than the first years. I've also seen fourth year students do it, the fourth year students incidentally demanded that they do it. And that was a successful project. The difference with that one was, I suppose, the details were certainly more refined at the fourth year level. I've always hoped that it should be an option where even fifth year students could apply their, their greater knowledge, so to speak, in doing something in the learning by making, um, at the top end of the school. We have only one example of that, but it was essentially built by others, and that's the

	Ravenswood Skate Park. Mmmm.
Interviewer	So when we talk about one of the first ever recognized learning by making experiences, when we talk about Robin's shed, with the process, how did that evolve? Did it evolve, that the design was broken into components because of the sheer size and number of students that you have in that class, and that's how you can deal with them all being involved in the one design, or, how did that come about?
Lecturer 2	Ah. Yeah, I think you've guessed it and you've hit it on the nail. Um, because all the previous exercises that I've been involved in have been with numbers between ten and twelve, and probably 15, you don't have that problem, everyone can be involved. Um, the Robin's shed one, we had, I can't remember how many first year students, it could've been 30-something, close to 40, no it might've been, six or seven ..... I think it might've been about 37 students or whatever, and we thought how on earth, we were worried, we didn't quite know how to do it, but we wanted to do it anyway as an experiment to see what could happen. And it was really straight-forward. Ah, a small building has six sides: a floor, a roof, and four walls. OK, that's six. If we divide six into the number of students, we've got about six per team, or five. Therefore what we should do is write the rules of the game, so to speak, so that all six teams have to have a reason to really negotiate and be involved with the other teams associated next door. In other words, a wall has a floor a roof, and two other walls.... So you're missing out one wall. So we looked at that as a puzzle, and almost like a game, and wrote the program around that, and that of course kept everyone engaged, and everyone was more-or-less connected to a substantial part of the building, but responsible for a bit. So I suppose you could say it's manipulative in the sense that it's organized very tightly and has ah, worthy experiences for the individual, right, all the way through. So we set it up as a game, XXXXXXXX
Interviewer	So, in that case, um, did you always know that it was going to be a collaborative design process for one thing. Like there's many other options that other schools use, where teams design the same project, or individuals design the same project, and then from some decision process they come with one design.
Lecturer 2	Oh, yes, no no, I disagree with that, because that's just reinforcing the singular, or the prima donnas designer. Ah, no, no, there's no.... prima donnas are here anyway, you don't have to teach prima donnas to be prima donnas, and they're a dime-a-dozen. Um, the most important thing you learn in architecture, I think, is learning to work, ah, collaboratively and within teams, and, because teams are terrific: they can achieve so much. Ah, and we're very conscious of that. I was at the same time, also, doing other bits and pieces, ah, consultancy work with colour, where I was getting excited about the fact that you could have a client group and processes where clients could more or less take charge, or ownership over a colour-scheme. And what I enjoyed about that most was the fact that the result that came up was new for me, because I didn't do it as a prima donnas, *(laughs)* but, within the colour scheme there was a verb, a life, an energy, um, as well as the ownership and it was very, very exciting to see what a collaborative team approach could come up with. And in a sense that's a little bit anti-traditional. And, Robin's shed was just like that. But to allow that to happen with Robin's shed, Robin and I said to ourselves, well, look, for this to work we cannot condition the result, um, we've got to let anything happen and not be embarrassed by it, because it's the students' work, and does it really matter anyway? So we had no idea what was going to happen, and that also put us on edge, too. You know, that's very exciting for us. It's like we get this huge teacher's present at the end, with absolute surprise, we didn't know what was going to happen. And that's such a joy, and yet we don't own it, you know, the students own it, it's just, just fantastic!
Interviewer	So when you did Robin's shed, had you ever in your teaching experiences, with the students, done a collaborative design before?
Lecturer 2	Oh, yes. Oh this is interesting! Ooooh! Yes, yes, yes, the stage sets. They were done like that. Because I'd have 15 or 20 sometimes involving the drama people and we'd use a process that hung around a core metaphor where everyone read the script. And the script, if, if you could say is like the rule-kit or the rule book for the stage-set design. Everything must come back to the script, it must work with the play, the actors, etc, etc. And the process there was to generate from the understanding of the rules the core metahor and everything being in the design process worked back to the core metaphor. And that was a management tool for having a number of teams working on different sections of the play, but making the whole play come together

	and read from start to finish visually. And yeah, but I got that from Peter Hammond, he's a theatre teacher in the Uni. Yeah, that, that probably taught me a bit, mmmmm.
Interviewer	Which just, um, jogged something in my mind too, I remember your mum saying that she used to do stage backdrops. Did you ever used to help your mum with theater backdrops?
Lecturer 2	I've got a very vague memory of being around. And I can just recall doing some painting, but I don't think I was given an important task, but I loved being there when I was there. And I just loved looking at it. And I can certainly remember seeing the place. Mmmm.
Interviewer	Because one of the questions I wanted to ask you is um, can you recall any um, memorable design making experiences you had when you were a kid.
Lecturer 2	Oh, yes, yes, yes, yes, yes. *(Laughs)*. Oh, there's heaps I could talk about, but I'll pick two contrasting ones. One I think, the first one that was really, really good fun, and I must have been so young. Um, it involved my brother, myself and my mother, and the task was: let's build a sand-mill. And that's what mother said, and I had no idea what a sand-mill was, and my brother probably didn't, either. Um, but the point is we were all cutting cardboard, gluing whatever, in other words, we were all working together. My mother probably had a grand plan. And it had a wheel, that you put sand in and it made noise against the cardboard, and you know, it was a very simple thing – but we were little kids. And yeah – that was great fun. I can remember that very, very well. Because the thing was taller than I was as a little child, um, yeah that was good fun. Now, that was a team thing. Oh, and the other one was an individual one but I won't mention that one. Um, team ones….. mmmm…..
Interviewer	It doesn't have to be a team one.
Lecturer 2	Doesn't it? Oh making….
Interviewer	Just making, things you designed and made things as a child….
Lecturer 2	Oh yes, well look the funniest one….. oh there's two, there's one which was a rocking chair. *(laughs)* We borrowed a chair, an old pine kitchen chair, and with an axe, made – because we didn't have tools to make the curve. And that was problematic, but I wasn't going to be beaten, so what I did – I fashioned the rockers – the rocking rails with an axe, and then attached them to the chair. And I distinctly remember putting the chair on concrete, sitting in the chair and giving it it's first go. And all I did was, I fell over laughing, because it was so funny. *(laughs)* It didn't work, I mean, sorry, it worked, but it was such a rough ride. *(laughs)* but why it was even funny is because other people were secretly watching me do this, and of course, they couldn't stop laughing either, so…. Oh God it was so…. *(laughs)* yeah. Um, that was pretty extreme. Another one was a paper-mache canoe.
Interviewer	*(laughs)*
Lecturer 2	Ah *(laughs)* All I had was chicken-wire, and lots of paper, and I made some glue. And I was determined if I put water-proof paint on this, I was determined that I could make a water-proof paper-mache canoe. And of course, I did, I made this canoe and of course, it floated. It was fantastic. It didn't last long though. *(laughs)* And I kept that up, because everyone said it's never going to work, and I was convinced it might. So I gave it a go, and it did work. I don't think I'd make, ah, I could make another one. *(laughs)* I was very young.
Interviewer	So, was your older brother involved in all this making and doing with you, and by yourself as well, was he very much like that?
Lecturer 2	He didn't make little things on his own, but we would do things together, obviously – cubby-houses. But the, the fun things were that we'd get together, um, and he was more interested in mechanics, so he'd be pulling bikes apart, and whatever, and then of course, we got a little car, he'd be pulling that apart. Um, but a fun thing that I can remember doing with him, was, ah, we'd go down to the shed, which was only say 70metres from the house, and the shed was a wonderful store-house of not only tools and bit-and-pieces, but everything. It was just a full farm-shed. And there was a large open space between the shed, and then some other sheds that you had to drive through um to get up to the house. I don't know what got into my brother and my heads, but, what we did, with bags which were fertilizer bags, plus crates, which were fresh fruit and pineapple crates, we built a city. But the trouble is, the city was so large, vehicles couldn't get through. And bags were nice to be inside, you know, like the roof was bag, walls were bags hanging, and bags could be put between boxes, and then hang, so you could have doors and windows. And we just got so excited just using boxes and bags, that we ended up with this small little town, so to speak. And

	of course, yeah, that was good, it was a totally collaborative effort. Yeah. A temporary cubby-house.
Interviewer	So would you say you were very influenced by your environment, by the fact you lived on a farm, with access to a workshop, that you had parents who made you do things all the time....?
Lecturer 2	Oh, yes! Like I can remember my first welding exercise. Um, my father wouldn't let me weld, because it was dangerous, but I couldn't, I had to watch. And of course, I knew not to watch when he was welding. But, they were making trailers and all sorts of things. But I noticed all the off cuts of the metal and *(laughs)* he showed me some basic welding, which probably took about half and hour, and I distinctly remember sneaking down to the shed and turning the welder on, right, and dragging out all these off-cuts, and welding them together. The welds weren't very good: Dad called them 'bird-shit welds' because they weren't strong. Now, this metal sculpture, I then carted home, and put it on the verandah and I can remember my father really enjoying that, and of course, he complained about the welds, but I knew he was joking about that. And then I made some more. And that was the tone of the day. As kids, we could do anything if we weren't destructive. But if it was creative, that's perfectly OK. And in the environment there was, oh, endless, endless options. I can remember weekends where we, you'd just start looking around and you'd see things and you'd come up with ideas and do it. Yes, from a very early age, it was like that. No-one stopped us mucking about in the shed.
Interviewer	You've also reminded me of when I was talking to um, Lecturer 1 yesterday, we were discussing a bit more about the process of the early learning by making, and I was asking her whether models were the first thing that came to mind, or just happened that your students were designing by models, or did they design models and drawings in the first Robin's shed in the process.
Lecturer 2	Oh, gee, I can't remember, but I'm pretty sure they used models and drawing, because I can sort of vaguely remember, um, gee Lecturer 1's memory might be better. Um, but the whole idea of, well, let's say discouraging drawing and using modeling, um the first game of it was in Robin's shed, and the point was, using models you can go through a number of repeated quick exercises, and not waste lots of 1:1 material. Right, we couldn't afford, we had a limited amount of material. And modeling is traditional in learning architecture, so modeling was good. Modeling was connected to the game. In other words we could test using the model, how all six sides came together, in terms of accuracy. So we could talk about the need for accuracy. Also, the models, um, became important for students to see the whole object. So, you know, models are essential for a whole string of reasons in that process that we use. Um, I don't know whether that was the first, oh no, we used stage-set models – it's all mimicked. It all has to be modeled and go through a client process – that was all done that way, too. Even the XXXXX ones, models 1-10 we used, and 1-5 later on. Was that your question, sorry?
Interviewer	Yeah. I was just trying to work out when you first instigated this process when you started experimenting with learning by making, whether drawings are part of the process.....
Lecturer 2	Oh right, yes.....
Interviewer	It's slightly discouraged these days, and models are used more predominantly.
Lecturer 2	Oh, yes, OK. Yeah, I can pinpoint that. I think the, yes, of course, the Robin's shed, people drew. And Robin, Lecturer 1 and I would all say, "Oh, hang on, let's make a model," because Lecturer 1's like that, too. Let's make a model, so we'd make a model. So we'd say that. Oh, that drawing's too hard to understand, let's make a model. At that same point, we also discovered, and I can remember this happening in the mind, now that you've jolted it, and I think I might've um, that conversation might've been with Lecturer 1, Robin and I. And we decide then that drawings are incredibly dangerous things, like words. They can have many interpretations by a range of different people, yet the words always start with one person. Whereas models – if you jointly make a model, it's almost like the sticks, or the bits of the model are universal grammar that everyone has ownership of or can... And it only means one thing, you know, there's a stick, it's there, that's how big it is, that's how long it is, and everyone's looking at its 3-dimensional qualities. There's no disagreement, there's no interpretation. I don't know if that answers the question. I can't remember, but it probably would be that thing. It's a long time ago.
Interviewer	Yeah, I was just wondering when that sort of arrived in the process or whether you

	deliberately started only with models, or this was something you found out through experience from doing it with the students, that it became more focused using models……

Second interview occurred with Lecturer 2 a week after the first interview
Time duration: 1 hour

Interviewer	….so if we're talking about the social setting, can you describe your relationship with the students, as a lecturer, facilitator, ra-ra-ra. How would you describe it?
Lecturer 2	Oh, OK, that's fairly easy to describe. Are you talking about the summer school?
Interviewer	Yes.
Lecturer 2	OK, I don't know the students, so that makes the teacher-student relation in the traditional sense very easy – in other words you haven't formed any bond or relation from previous teaching experiences. Um, now to maintain the separateness as facilitator, I believe is very, very important, um, in this sort of thing because um, in other words I don't go out and drink with them after the event. Right, because what that, that will damage or ruin the potential to do certain things that you need to do through the process. Um, and it's the same with Robin, right? The social… so that's one aspect which is about formal teaching, and you know, formal teaching and the learning experience. Um, there is a side to what you probably could call a social relationship which is a 'quase' social relationship which begins to develop, right? Which is more about the game play, ah, where I will let down certain guards, where so they see certain aspects of my character. But that's teaching technique. And I will do that for various reasons. Examples would be to appear as a very different teacher, so their judgment of what teacher is does not pollute the potential outcome of the project. In other words, a different teacher, or something new, that their being confronted by or, or encouraged to look at, or whatever on that scale, can be of great value in managing and speeding up processes and getting things really rolling. An example of that would be, um, I might show my cheeky character, right? But I'd show it at a certain distance and I know that they look twice: "Oooh, this is different." *(laughs)* So, yes I will let down certain things, that have to be about yourself. Now that demonstrates to a student you are, you are genuinely, really interested in what they're doing and what the activity is, as a teaching technique. Quite aside from the fact that I am very genuinely interested, right? But there will be certain parts of me that I will show, and it's to do with that. But that's not a complete social relationship. Is that what you mean by social relationship?
Interviewer	Yeah.
Lecturer 2	Yeah, OK.
Interviewer	So you say that it's differenced because if the bus-stop students because you don't really have relationships formed with them via people.
Lecturer 2	Yes.
Interviewer	How would you describe your relationship with the um, pre-existing students?
Lecturer 2	Ah, the, the, with the existing students that you've taught before, because they already know that side of you, as a teacher you have to rely on perhaps, in some instances, the strictness of program, or even handing over um, in some cases, a total responsibility for directing things. In other words ah, with our own students, and you've been through it, you can take it to the full level where you can really just appear as a consultant that they approach when the, right? And that's another technique that you can use, where you can maintain that separateness. So I'm a consultant, and they say "Oooh we haven't had a consultant before, we've always had a teacher." So that changes, shifts the game play in the contract: the teacher-student contract.
Interviewer	So is it by the way that you behave when you approach them that they understand this difference? Because I've been in studios when Dad goes "Oh, by the way I'm a consultant," or "I'm a facilitator," how do they, or what actions do you do that this different experience a XXXXXXXX
Lecturer 2	Ah, well yes we do explain things in the beginning, and of course, students often forget that, *(laughing)*, because it's at the beginning of the day. But, it's difficult to

	give a short answer to this one, simply because I might be working with one student or a group of three, or in some instances a group of twelve or a group of forty. Right? There's many combinations. And as a teacher, not only is there the general agenda of the rules and how you've set the game up to achieve things within a certain framework of time. There's all of the other intricacies that the students bring to the event, that as a teacher you have to respond to, sometimes instantly, engage and, it's always included, you see, because that's the driving force. So it's a very hard question to answer *(laughing)*, because you're literally working on your feet every second, right? And you don't know – there aren't techniques to deal with it.
Interviewer	So you're working on your feet to support the number of them to explore and make their own decisions, while not actually telling them what to do?
Lecturer 2	Oh no, no, you can't do that. Oh that would completely kill it. It would die instantly. Because there's no vested interest. Um, yeah, no you can't do that. Ah, techniques……
Interviewer	Might I suggest to you that that's one difference, perhaps, in the way you behave as a teacher that the students may see you in a different light – that you're not actually telling them what to do and XXXXXX
Lecturer 2	Yeah, I suppose if we had to reduce it to a few um, important facets or beliefs, number one is you must appear, even if you are not, you must appear genuinely interested in where that student is at, at that moment. Now in 99% of the cases, I am genuinely interested in where that student is at, because that is my profession, and that's how I see it. When there's that 1% time where I may not be genuinely 100% engaged or interested, I have to at least appear that, appear that way. That's very hard. There's a lovely equation there is students are so perceptive, so bright and so with it if they're fully engaged, that they can see through any act. So it's very foolhardy – *(laughs)* it doesn't work. In other words the best premise for a teacher is to assume that the students are just so engaged, so with-it, so interested, and respond accordingly. If they're not interested, and I perceive that they're not interested, um, oh, I will try to enthuse them, I will try to you know, help and facilitate that engagement. And if that doesn't work, you know a technique is just to use the mirror technique in that sense. And that is I put the mirror back up, and I don't show them the same courtesy. You know, that, say if they're not interested, I won't be interested in them. But I will continually watch and wait for that moment when there is the glimmer, and then you go in. So it's all about timing and watching.
Interviewer	So what would you say your relationship would be with your other lecturer and the workshop manager?
Lecturer 2	Oh, that's, that's beautiful. That's so unique. *(laughs)* Ah, well, I can talk about how I approach things in great detail, Lecturer 1 can, Robin can, and we've all got very different personalities. We've got common interests, etc, and the relationship there – I mean it's very simple, we all respect so strongly our differences and our common goals and the most beautiful thing about that relation is that say, if I'm out there on the floor and I can't do something, or I sense that I'm not, oh, and I think: oh Lecturer 1, I know Lecturer 1, I know how she works, hey I reckon he/she could…. I'll say "Lecturer 1, how about XXXX?" and Lecturer 1 will go over there and give it a go. So it's not like we've got one teacher on the floor, we've got, sorry, we've got one teacher but it's made up of three different personalities and all of the richness of those different techniques. We found that as a group of three, very, very carefully, and manipulatively. Like for example, there might be a situation where the program's going down this track, and it might require that people have to suddenly bring to bear on their design thinking the limited resources. And Robin will lead that, and Robin will talk about how much material we actually had, and we'll start counting. But Robin will lead that. And if there's something about this other facet, that, you know Lecturer 1's really, Lecturer 1 will, you know, so it's all, it's us really dancing in a very coordinated way.
Interviewer	OK, now, if we talk about some specific students that I was actually studying during the bus stop, you may have difficulty with some of them, but I know you will be able to comment particularly on Student 2…..
Lecturer 2	*(laughs)*
Interviewer	What would you say your relationship with Student 2 was?
Lecturer 2	Ah, *(laughs)* it was really good to see Student 2 as a maturing architecture student, because I did not know that that side of Student 2 although I did know Student 2 as a young boy, because obviously he was such and such's son. Um, and I've always

	thought Student 2 was a wonderful person, etc and there would've been a gap there of, oh, it could've been three or four years since I'd last seen Student 2. Um, my relationship with him obviously had leftovers from the past in terms of how he was me. Ah, my thoughts about him were, he was this wonderful architecture student, well-received at their university, etc, etc, and I was quite, I was quite odd that he'd come back to do the project with us. *(laughs)* I was getting to know his new personality so to speak. Because obviously he's an adult now, and he was not at all like he was when I last knew him. That was really good fun to get to know Student 2. It may have been very quick for us to get to know each other, because I had that prior um, knowledge of him.
Interviewer	So what would you oppose in your observation of him. What was you main bus-stop with that XXXXX. What would you say, um, what type of student was he, in what you thought?
Lecturer 2	Oh, it's lovely. Do you want me to describe him/her as an architecture student?
Interviewer	Yes.
Lecturer 2	.....and what his/her passions are? Oh, right. He/She was, , so interested in the process that we were doing, because Student 2 had become quite skilled politically, and as a people-person. And although he had strong design ideas, the strong ideas came from, were learnt things about values. You know, they could be architecture lessons or whatever, but it's all learnt. It wasn't from a purely artistic sense or point of view. And, um, that was a challenge for me in the sense that I think he/she's a big learning agenda there, apart from the object, and making something that was frustrating sometimes, was he was learning a process of engagement with many, or refining something he had already learnt from Melbourne Uni. And, it's almost as if he/she was using the summer school as this wonderful or vehicle to play that out. Um, all of them are the most positive aspect, of course. And at times, it was so frustrating for him/her. And what he/she was dealing with often was, his/her own personal frustration with a single will, with a group will. And this thing, because he/she's such a strong passionate person, that got him into lots of trouble, and the group into trouble occasionally. So it was about testing of wits. But I loved watching it; I thought it was fantastic. *(laughs)*
Interviewer	In that um, case, did you, would you have um, similar observations or knowledge of the other two students that were on the XXXX: Student 3 and Student 1?
Lecturer 2	No knowledge whatsoever, it was the first time I'd met them. Yeah.
Interviewer	So you can't recall anything about them that.....?
Lecturer 2	Prior to the summer school – none whatsoever.
Interviewer	I mean during the summer school.
Lecturer 2	Oh during the summer school! Oh, I could describe them for you if you'd like. *(laughs)* In integrate detail. Um, right *(laughs) Who* will we take first? Student 3.
Interviewer	Yeah, take Student 3.
Lecturer 2	Student 3 was fantastic. I noticed it from the outset that she was obviously a serious punter in the adventure. And, well one, because of the questions she was asking and how he/she was, you know, engaged. And, although he/she would sit back as a student, an apparently back-stage viewpoint, when he/she wasn't noticing that I was anywhere near, he/she would be fully engaged. But he/she would always take a paused time-out to reflect and um, gather, you know his/her actions or what, you know, how it was all working. Um, I also noticed that he/she was such, he/she held in absolute respect what we were all doing as a team, you know that was remarkable, you know, he/she was genuinely going to give it everything he/she had. And think about it at the same time. So I thought for me, that signaled that someone was very serious, um, ah person, out for a good learning experience, out for seeing how things can challenge his/her perceptions, plus this other little adventure about learning about materials. So she had many, many agendas. And, oh he/she was a delight to work with. The nicest thing at the end for me was some of us working with the um, XXXX a bit of metal work. And we had terrific conversations where ah, we were just mucking around with what would happen with the metal work. And then of course, to see her so excitedly go up to the metal shop. I thought wow, he/she's taken total charge of this opportunity, and extended it beyond what we would normally expect. That was terrific. Um, his/her, partner *(laughs)* well I can say that can't I? He was good, too. But I think he, I learnt later, I knew that there was a teacher, that came, that enrolled in the student bit. Ah, but because we didn't know who it was, I think for the first half day or day, I can't remember we didn't literally know who it was. And

	because he/she didn't sort of announce that he/she was it, we had no knowledge for that first half day. And that was interesting, because we couldn't work out what, how to react or respond, so we just went along as normal. You know we just thought, we don't know, it's got nothing to do with us, so let's just do it. Um, and then we could see it pretty quickly. And then, I was waiting for him/her to probably sit down and have a conversation with us, as one would normally expect, but that didn't occur, because everything was so busy anyway, he/she didn't have the opportunity to do it. Um, and I was watching very closely to see how he/she would work within a group, because obviously he/she had a lot more experience than the students, and so I was on guard, if you'd like to say that because I did not want someone with a lot of experience to in some way muck about with that wonderful adventure that people in the same experience group could get out of it. That was interesting watching him/her dancing around that one, because there was some aspects that obviously I missed ah, that came through, and yeah, that was an interesting one, that the other side of him/her that I thought was beautiful was such an impassioned *(laughs)* impassioned debate about, well the architecture of it. You know he/she was so wanting to engage in that, on such a you know, funny little bus-stop building. You know, that was, that was extraordinary. So.....
Interviewer	That it mattered to him/her so much?
Lecturer 2	Yeah, yeah, no that was really, really, really positive. And I think, that a lot of that was in a sense a role model for others in the team. That was good to watch. And at the same time, he/she also was very careful not to sort of take over. And I could see him/her struggling with that passion, and that, that whole team thing. Yeah, it was very interesting watching, yeah, yeah.
Interviewer	Do you recall anything about Student 1? XXXXX
Lecturer 2	Oh, Student 1 *(laughs)* Oh, he/she was so energetic, and doing things and.... Yeah I do. He/she had the ute, oh no he's friends with the fella that had the ute. Ah, he/she also went across to the bridge, didn't he/she? He/she went on a two day holiday in the middle of it, walking, it was the east coast.
Interviewer	Yeah there was a group of eight of them.
Lecturer 2	That's right that went up and down the east coast.
Interviewer	In the minibus that went to Hobart and then they went across to XXXX
Lecturer 2	Yeah, yeah. Oh.
Interviewer	He/she was the person who was on the computer that did some drafting work and did a fly-through model of the bus-stop.
Lecturer 2	Of the bus-stop? Yeah. I didn't watch him, because I was working a lot on the Chickenfeed bus-stop, and Lecturer 1 was working on that one, um, although I'd speak to him/her in Robin's office on the computer, um, *what are they doing out in the middle of the garden, they're taking photos.* He/she, I taught with him/her outside, next to the ute, you know where there would often be process discussions, he/she would be interested, really interested in the sequence of things and whatever, um, and he/she was always, always there, early or late. You know, he was amazing. Um, totally energetic, worked flat-out, almost like a fellow that had been on-site before, the way he related with everyone. So he/she was there during the work offer. I didn't witness him/her having a big passion of art in the parts of that building. So I can't comment on that. Um, and because he/she was a little bit older, right, ah, I knew that I didn't have to worry about him/her, because he/she was, a really genuine punter within the system, so I could put my efforts looking at other people. Yeah. I mean I like him/her – he/she was terrific.
Interviewer	What would you say your relationship with myself, as the interviewer is?
Lecturer 2	Oh..... Well, apart from um, working with you in the past, and sort of knowing, knowing you quite well from the period that I've known you which was you know, sometime back, and then again as working with our school. Um, ah, I'm always very interested in your perceptions of things, because I know you're researching something I'm passionate in. So, I have the utmost respect for that. Also it's difficult for me sometimes because I know that I have to distance myself so that like, in no way do I want your research in any way sort of compromised by um, ah, that relationship, right? So that's interesting. And sometimes, you know, sometimes, you've just got to be careful. Hence I joke about you and your XXXX outside. *(laughs)* Yet at the same time I'm intensely interested to see what it is. Um, do you mean during the summer school as well?
Interviewer	Yeah.

Lecturer 2	Yeah, well during the summer school, that was very easy and clear for me because I was flat-out doing what I had to do, I was aware that you were there, and ah, I was very excited about what you were doing. I had no idea what you'd find or whatever. Um, and, well you were there, just doing it. You know –doing your thing, um, and that's fine. So I had no trouble with that whatsoever. I mean I was secretly very, very excited about what, you know, what the outcomes would be, I mean that's, that's, I just see that as a XXXXX That's very exciting for me. Um, yeah, no, easy, why? *(laughs)* I mean I could turn those buttons on and off, you know I can be in that situation where you're doing your research and I'm doing my teaching, um, I didn't ask you to help teach did I, during the process?
Interviewer	No…..
Lecturer 2	No, yeah…..
Interviewer	…..I was just involved in the introduction bits……
Lecturer 2	That's right, yeah.
Interviewer	I was talking to them about it on Saturdays.
Lecturer 2	That's right, I think I can remember having to be very clear about that, because it would wreck your, you know it wouldn't, it wouldn't…. yeah. Did you go out with them?
Interviewer	Yes I did.
Lecturer 2	Oh, you see, I couldn't *(laughs)* Oh dear, yeah. Does that describe it enough?
Interviewer	Yeah. Another thing I want to ask you about is can you reconstruct a memorable day or event from the bus-stop summer school?
Lecturer 2	Oh, a memorable day…. It's all so intense, that in such a strong experience, that the mind has trouble editing things, and the edit doesn't usually happen until much later. Ah, it's still quite close, but personally, *(laughs)* I think the most memorable thing would be lifting that bloody Pizza-Hut thing off the back of the truck. *(laughs)* And then having to drive down the road on my own, and then hitting a street sign, with it going clutter-clutter-clutter along the roof. Well that's not a good memory, but that's a strong memory. Um, and that was a fairly, you know, intense moment. Um……
Interviewer	Can you extend the XXXXXXX as you talk about that's a strong personal memory, what about a strong teaching memory?
Lecturer 2	Oh. The strongest teaching memory, I was, the strongest teaching memory for me was when they got up in front of the council with these really beautiful models, and I was just in the background with Robin, and we weren't saying anything of course. And a really strong memory was them performing, you know, doing what they'd been taught to do in other schools, and to show off this design. But do it in such a relaxed way. I don't know, they were so confidant, totally relaxed, and then of course all the council people just being completely spellbound by what they saw in front of them. And, that's memorable because I was a little bit shitty, with the fact that they just got the Rolls Royce ticket just like that. Bang! It was so easy for them. Um, perhaps they deserved it to be easy because it was so good. But I was hoping for a more thorough going ticket for the building approval. It seemed to be so, you know, so amazing. They awed these people over just like that. And that was strong. Um….
Interviewer	What was your recollection of bringing in two external people to the bus-stop project?
Lecturer 2	Oh, you mean Architect 1 and um, Architect 2?
Interviewer	Yes.
Lecturer 2	Right. Um, well from the outset of it, the recollection of it was fairly straight-forward because I knew at that particular moment, there was great discussion about Pizza Hut, and what it was looking like, and why it was looking like this, and how it was built, and whether that was appropriate, and all of this sort of stuff. And the bird was going round and round and round in circles, and they were being lost and tied in knots, and I knew everyone thought Architect 1 was a pretty well-respected fellow, right? And, I think it was Student 2, or, or someone else that they were interested in showing it to others, because I think that was their normal learning process – you know, they wanted more critique, they wanted to enjoy the *(noise disruption)* they wanted to enjoy the discussion of design. They really loved that, I mean, they would've gone on till midnight if you didn't stop them. Um, so I thought oh, that's alright, we'll get the big revered experts, and then we'll let XXXXX happen. And that can happen over there. And they sat there and it took place. Then of course, Architect 1 and Architect 2 were in with the standard critique tactic, which is in architecture schools all over Australia. And the students pitted their wits against the great masters, and I caught

	the tail-end of it, and I was very angry at myself for letting it happen. Because I knew then that that was like a force of gravity blacking back into the black hole of traditional power-games of learning architecture. Ah, I thought: "Bloody hell, what do I do here?" And then of course, it divided the group, it's the old technique of divide and conquer, you know that's how the power game works. And, so I felt guilty for letting it happen, and then of course, we had to deal with it didn't we? The next day. So, I mean, I talked with Lecturer 1 about it, we talked, and talked and talked, and the agreement was that we were, we'd just sit down and have a full group discussion about what was what, what it meant, did it mean anything, we're in this situation now, we have to deliver a bus-stop, what are we going to do? And we, I remember doing a fairly impassioned um, and straightforward seven or eight minute comment on the event. But we got back on track – yeah interesting learning point for us. But in the sense, maybe it was a good thing, you know, there's a lot of things you can't control.
Interviewer	Have you ever done that before that: brought someone in blind?
Lecturer 2	Ah, no, no, because the interesting thing with the other aspect of the Pizza Hut and the Chickenfeed bus-stops was we had the engineers and people from the conference come in, but that was totally prepared. I mean, I went into the lecture.....

Third interview with Lecturer 2 did not take place due to unforseen absence

Appendix 7.1: Questionnaire for Study 3

THE OUTCOMES OF LEARNING-BY-MAKING STUDIOS

Short Answer Survey, for Final Year Architecture Students who have participated in Learning-by-Making projects

1. Can you please list the name of the projects in which you have contributed to the design and construction of a small building/ or piece of furniture and the your year level at that time? (For example, Deloraine Playground, 2nd year)

Project	Year Level

2. Reflecting over your architectural education at UTas, what was the educational **value** of Learning-by-Making projects for **you?** (i.e. design and build a small object)

3. Have any of your past experiences in Learning-by-Making studios assisted your understanding of:

- the Design process
  (For example your perception or attitude towards conceiving architecture or level of resolution required in detailing ideas to be realised in built form)

- any other processes, skills or knowledge? (For example, basic understanding of the cost of materials)

4. In your above description of processes, skills and knowledge, are any of these applicable to your current work or future work needs?

5. If Learning-by-Making has influenced your design process, can these considerations be only applied to small-scale projects or to larger-scaler projects, as well?

6. Do you think that the Learning-by-Making projects provided a good insight of why the design process should include/ incorporate construction considerations early in the process?

Appendix 7.2: Informed Consent Sheet for Study 3

INFORMATION

In finalising my research conclusions, I would like to know in more detail what you thought that you gained from Learning-by-Making studios and whether these experiences provided a sound foundation for you to advance your knowledge or whether aspects are still as relevant or applicable to your work today.

Project Title: *The Educational value of "Learning through Making" for Architecture Students*

STATEMENT OF INFORMED CONSENT

a) I have read and understood the Information (above) for this study.

b) I understand that all research data will be treated as confidential.

c) Any questions that I have asked have been answered to my satisfaction.

d) I agree that research data gathered for the study may be published provided that I cannot be identified as a participant.

e) I agree to participate in this survey and understand that I may withdraw at any time without prejudice. *

Name of Participant: .....

Signature of Participant: ..... Date: .....

Chief Investigator only
I have explained this project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

Name of investigator: Louise Wallis

Signature of investigator: ..... Date: .....

---

*Item 6:
Participants will not be prejudiced in their academic standing if they chose to withdraw during these surveys.

Appendix 7.3: Analysis Codes for Question 2 (Study 3)

Analysis Codes	Abbreviations
Communication/ Interpersonal Skills	Comm
Teamwork Skills	Team
Principle of Practical Experience	Prexp
Incorporation of theory and practice	Thprt
Project Management (Budget, Time Management)	Prmgt
Connection between design and construction	Decon
Design/ Build – process	DB - pro
Design/ Build – implications/interactions with client	DB – clt
Design/ Build – physical realisation	DB – rel
Design/ Build - materials	DB –mat
Design/ Build - detailing	DB – det
Design/ Build – construction process/ techniques	DB – con
Design/ Build - tools	DB - tls
Design/ Build – time/effort	DB – tme
Design/ Build – model	DB-mod
Design/Build – comp router	DB- cprt
An Advantageous experience, early in architectural education	EalEd
Aided connection between architectural units	CnAUt

References

'1947 Institute Council Meeting' 1948, *Architecture*, January, p. 13.

An Essay on the Qualifications and Duties of an Architect, 1773 (A pamphlet attributed to George Dance the Younger; see *R.I.B.A. Journal*, 1935, XLII, p. 648)

Andresen, L, Boud, D et al. 2000, 'Experienced Based Learning', in G. Foley (ed.), *Understanding Adult Education and Training*, Allen and Unwin, NSW.

Angrosino, M and Mays de Perez, K 2000, 'Rethinking Observation', in N. Denzin and Y. Lincoln (eds), *Handbook of Qualitative Research*, Sage Publications, Thousand Oaks, California.

Architects Accreditation Council of Australia 2001, *NCSA 01: The National Competency Standards in Architecture*, Architects Accreditation Council of Australia viewed March 2000, <http://www.aaca.org.au/NCSA01.PDF>.

Association of Collegiate Schools of Architecture 2002, *Architectural Education*, viewed 16 May 2002, <http://www.acsa-arch.org/architecturalEd.html>.

Ascher-Barnstone, D 2002, 'Building designs for Living Studio 804 University of Kansas', *Journal of Architectural Education* 55, pp. 186-193.

Ashton, D 1997, 'Preface', in E Hochman, *Bauhaus: Crucible of Modernism*, Fromm International, New York.

Auburn University 2002, *Rural Studio: Mission, Auburn University*, viewed 1 November 2002, <http:// www.ruralstudio.com/mission.htm>

Badanes, S 2001, 'Letter to Editor: Many Heroes in our Midst', *Architectural Record*, 189(5), p 26.

Biggs, J and Moore, P 1993, *The Process of Learning*, 3rd edn, Prentice Hall, New York.

Bilello, J 1996, 'Learning from construction', *Architecture*, 85(8), pp. 145-149.

Birrell, J 1997, 'Passive Solar Greenhouse' in J Vulker and L Johnston (eds), *CHASA referred designs 1995 and 1996*, Queensland University of Technology, School of Architecture, Interior and Industrial Design, Brisbane.

Boyer, E and Mitgang, L 1996, *Building Community. A New Future for Architecture Education and Practice*, The Carnegie Foundation for the Advancement of Teaching, New Jersey.

Blomfield, R 1897, 'A History of Renaissance Architecture in England', vol 2.

Blythe, R 1998, 'S.W.T. Blythe 1905 – 1985 Architect and Educator', Master thesis, University of Melbourne.

Bradley, J 2000, 'Learning in Practice. A Retreat, an Opportunity or an Imperative?' in D, Nicol and S, Pilling (eds), *Changing Architectural Education. Towards a New Professionalism*, E & F N Spon, London.

Branch, M 1994, 'Building to learn', *Progressive Architecture*, 75(3), pp. 56-59.

Briggs, DC 1996, 'Reform the Design Studio', *Architecture*, 85(8), pp. 75, 77.

Brouard, P 1997, 'Construction Studios: Yale University', in W. Carpenter (ed.), *Learning by Building*, Van Nostrand Reinhold, New York, pp. 53-62.

Burke, K 2001, 'Big Guns Tell Architecture Schools to go Back to the Drawing Board', *Sydney Morning Herald*, 22 November, viewed 25 November 2001, <http://www.smh.com.au/news/0111/22/text/national2.html>.

Burns, R 1997, *Introduction to Research Methods*, Longman, South Melbourne.

Burns, R 2000, *Introduction to Research Methods*, Pearson Education, French Forest.

Caragonne, A 1996,'Beaux Arts, Bauhaus, and Regionalism: Architectural Education During the 1950s', in W Saunders (ed.), *Reflections on Architectural Practices in the Nineties*, Princeton Architectural Press, New York.

Carpenter, W (ed.) 1997, *Learning by Building*, Van Nostrand Reinhold, New York.

Cary, J (ed.) 2000, *The ASCA Sourcebook of Community Design Programs*, Association of Collegiate Schools of Architecture, Washington.

Clayton, I 1995, 'Small Buildings and Human Relations/Shed and Toys', *Rethinking the Built Environment, Proceedings of the Catalyst 1995 Conference*, Faculty of Environmental Design, University of Canberra, Canberra.

Clayton, I, Brannigan, B and Green, R 1997, 'Robin's Shed', in J Vulker and L Johnston (eds), *CHASA referred designs 1995 and 1996*, Queensland University of Technology, School of Architecture, Interior and Industrial Design, Brisbane, p. 31.

Clayton, I, Burnham, R, van der Schans, G, Spence, R and Green R 1998, 'The Duck Seat and Rav Shade & Play: To Design and Build Projects for Schools', *Designing Eco-Solutions, Proceedings for Catalyst 1997 Conference*, Faculty of Environmental Design, University of Canberra, Canberra.

Colquhoun, A 2002, Modern Architecture, Oxford University Press, Oxford.

Crinson, M and Lubbock, J 1994, *Architecture: Art or Profession*, Manchester University Press, Manchester.

Crosbie, M 1995, 'The schools: how they're failing the profession (and what we can do about it)', *Progressive Architecture*, 76(9), p. [47]–51, 94, 96.

Cuff, D 1996, 'Celebrate the gap between education and practice', *Architecture*, 85(8), pp. 94-95.

Dearstyne, H 1986, *Inside the Bauhaus* in D Spaeth (ed.), Rizzoli International Publications, Inc., New York.

Denscombe, M 2001, *The Good Research Guide for Small-Scale Social Research Projects*, Open University Press, Buckingham.

Dietsch, D 1996, 'Reporting on Education Again' *Architecture*, 85(6), p. 15.

Egan, J 1998, *Rethinking Construction. The Report of the Construction Task Force*, Department of Environment, Transport and the Regions, viewed10 January 2004, <http://www.rethinkingconstruction.org/documents/Rethinking%20Construction%20Report.pdf>.

Egbert, D 1980, *The Beaux-Arts Tradition in French Architecture,* Princeton University Press, Princeton.

Erdman, J and Weddle, R 2002, 'Designing/Building/Learning', *Journal of Architectural Education*, 55, pp. 174-179.

Esher, L and Llewelyn-Davies, L 1968, 'The Architect in 1988' *RIBA Journal*, p. 453.

Ferrey, B 1861, 'Recollections of A. N. W. Pugin'

Fletcher, H 1934, 'The R.I.B.A and Architectural Education', in J Gotch (ed.) *The Growth and Work of the Royal Institute of British Architects 1834-1934*, Simson & Co. Ltd., London.

Fowles, B 1984, 'Design-build projects in architectural education', *Design Studies*, 5(1), pp. 7-14.

Freeland, JM 1971, *The Making of a Profession*, Angus and Robertson, Sydney.

Freiman, Z 1994, 'Reality Check', *Progressive Architecture*, 75(8), p. 9.

Galton, M, Simon, B and Croll, P 1980, *Inside the Primary Classroom*, Rutledge & Kegan Paul, London.

Gatley, J 1996, 'A Contemporary Dwelling', in J Wilson (ed.), *Zeal and Crusade*, Te Waihora Press Christchurch, pp. 89-96.

Gotch J (ed.) 1934, *The Growth and Work of the Royal Institute of British Architects 1834-1934*, Simson & Co. Ltd., London.

Green, R 1998, 'Robin's Shed: Submission to the Review Panel', *Program and School Review. School of Architecture and Urban Design*, Faculty of Science and Engineering, University of Tasmania, Launceston, pp. 62-71.

Green, R, Clayton, I Burnham, R, van der Schans, G, Spence, R, Boyer, H and Smith, G 1999, 'The Duck Seat and Rav Shade and Play', in B Busfield and P Richards (eds), *1997-1998 CHASA Referred Design Scheme Catalogue*, Studio School of Architecture and Fine Arts, University of Western Australia, Perth.

Green, R, Clayton, I, van der Schans, G and Brannigan, B 1997, 'Tamar Island Gateway Project' in J Vulker and L Johnston (eds), *CHASA referred designs 1995 and 1996*, Queensland University of Technology, School of Architecture, Interior and Industrial Design, Brisbane.

Green, R and Parnell, M 2001, 'Community and the Student Vernacular: A Review of Six Years Experience of Building with Community Groups in Tasmania', *Community Technology 2001*, Murdoch University, Perth.

Green, R and Webster, J 1998, 'Timber in Architectural Education - Experiments in a Design Workshop Learning', *Proceeding of the 5th World Conference on Timber Engineering*, Presses poltechniques et universitaires romandes, Montreux, Switzerland.

Greene, J 2001, 'Mixing Social Inquiry Methodologies', in V Richardson (ed.) *Handbook of Research of Teaching*, American Educational Research Association, Washington, pp. 251-258.

Guba, EG 1981, 'Criteria for assessing the trustworthiness of naturalistic inquiries', *Educational Communication and Technology*, 29(2), pp. 75-91.

Gutman, R 1996, 'Redesigning architecture schools', *Architecture*, 85(8), pp. 87-89.

Hammersley, M 1990, *Reading Ethnographic Research: A Critical Guide*, Longmans, London.

Hammersley, M and Atkinson, P 1983, *Ethnography: Principles in Practice*, Tavistock, London.

Haysom, E 2001, 'Foundations Laid to Build a Strong Architectural Reputation', *The Courier Mail*, 4 December, p. 7.

'Heads of Schools Conference' 1950, *Architecture*, October-December, pp. 121.

Heritage, J 1984, *Garfinkel and Ethnomethodology*, Polity, Cambridge.

Herman, M 1970, *The Early Australian Architects and their Works*, Angus and Robertson, Sydney.

Hinders, K 2002, 'Copper: Material, Method of Construction, and Design in the Studio', *Paper for Association of Collegiate Schools of Architecture/American Institute of Architects, Design/build Conference*, Atlanta, Georgia.

Hochman, E 1997, *Bauhaus: Crucible of Modernism*, Fromm International, New York.

Ivy, R 1994, 'Rural Education', *Architecture*, 83(October), pp. 62-65.

Johnson, D 1997, *Reaching Out: Interpersonal Effectiveness and Self-actualisation*, 6th edn, Prentice-Hall Englewood Cliffs, New Jersey.

Kaji-O'Grady, S 2000, 'Speculating on Architectural Models', abstracts for *Architecture + Education 2000*, University of Sydney Faculty of Architecture, Sydney.

Kaye, B 1960, *The Development of the Architectural Profession in Britain: A Sociological Approach*, George Allen and Unwin Ltd, London.

Kirk, J and Miller, M 1986, 'Reliability and Validity in Qualitative Research', *Qualitative Research Methods Series No. 1*, Sage, London.

Knowles, M. (1984). The Adult Learner: A Neglected Species. Houston, Gulf.

Kolb, D 1984, *Experiential Learning: Experiences as the Source of Learning and Development*, Prentice Hall, Englewood Cliffs, New Jersey.

Kroloff, R (ed.) 1996, 'Alternative schools', *Architecture*, 85(8), pp. 159-167.

Kvale, S 1995, 'The Social Construction of Validity', *Qualitative Inquiry*, viewed August 2003, <http://www.ped.gu.se/biorn/phgraph/misc/constr/validity.html>.

Langdon, P and Fisher, T 1995, 'The debate goes on', *Progressive Architecture*, 76(4), p. 66-69.

Laybourne-Smith, L 1949, 'Education Conference', *Architecture*, (October), pp. 131-132.

Layton, E 1962, *The Practical Training of Architects*, Royal Institute of British Architects, London.

Lubbock, J and Crinson M 1993, 'Education for Change, 1938-1960: The Creation of the "Official System"', *Proceedings from the 22nd Annual Symposium of the Society of Architectural Historians of Great Britain*, SAHGB, London.

Marsh, C and Willis, G 2003, *Curriculum: Alternative Approaches, Ongoing Issues*, Merrill Prentice Hall, Upper Saddle River, New Jersey.

McLeod, C 2003, 'Green Architectural Discourse: Rhetoric and Power', PhD thesis, Queensland University of Technology, Brisbane.

Miles, MB and Huberman, AM 1994, *Qualitative Data Analysis: An Expanded Sourcebook*, Sage Publications, Thousand Oaks, California.

Mills, G 2002, *Action Research. A Guide for the Teacher Researcher*, Merrill Prentice Hall, Upper Saddle River, New Jersey.

'Mockbee's mission' 1997 *Architecture* 86(1), pp. 49-51.

Mockbee, S 1997, 'Auburn University', in W Carpenter (ed.), *Learning by Building*, Van Nostrand Reinhold, New York.

Morris, S 2001, 'Too many minds miss the mark', *The Australian*, 5 September, p. 33.

Naylor, G 1985, *The Bauhaus Reassessed: Sources and Design Theory*, The Herbert Press, London.

Nicholson, R 2000, 'Foreword', in D Nicol and S Pilling (eds), *Changing Architectural Education. Towards a New Professionalism*, E & F N Spon, London.

Nicol, D and Pilling, S (eds), 2000, *Changing Architectural Education. Towards a New Professionalism*, E & F N Spon, London.

O'Dwyer, E 2001, 'Architects Slam Lack of Vision, Inspiration', *The Courier Mail*, 26 November, p. 10.

Oppenheimer Dean, A 2001, 'The hero of Hale County Sam Mockbee', *Architectural Record*, 189(2), pp. 76-82.

Oppenheimer Dean, A and Hursley, T 2002, *Rural Studio: Samuel Mockbee and an Architecture of Decency*, Princeton Architectural Press, New York.

Packard, R 1988, 'Ecole des Beaux Arts' in J Wilkes (ed.), *Encyclopedia of Architecture, Design, Engineering and Construction*, vol. 2, John Wiley and Sons, New York.

Parlett, M and Hamilton, D 1972, *Evaluation as Illumination: A New Approach to the Study of Innovatory Programs*, Centre for Research in Educational Sciences, University of Edinburgh, Edinburgh.

Pearson, J 2002, *University-Community Design Partnerships*, Princeton Architectural Press, New York.

Pelto, PJ and Pelto, GH 1978, *Anthropological Research: The Structure of Inquiry*, Cambridge University Press, Cambridge.

Pendleton-Jullian, A 1996, *The Road that is not a Road and the Open City, Ritoque, Chile*, The MIT Press Cambridge, Massachusetts.

Powers, A 1993, 'Arts & Crafts to Monumental Classic: The Institutionalising of Architectural Education', *Proceedings of the 22nd Annual Symposium of the Society of Architectural Historians of Great Britain*, SAHGB, London.

Powers, A 1996, 'Liverpool and Architectural Education in the Early Twentieth Century', in J Sharples (ed.), *Charles Reilly and the Liverpool School of Architecture*, Liverpool University Press, Liverpool.

Geddes, R and Spring, B 1967, *A Study of Education for Environmental Design: "The Princeton Report"*, America Institute of Architects, Washington D.C.

Richardson, V (ed.) 2001, *Handbook of Research of Teaching*, American Educational Research Association, Washington.

Royal Australian Institute of Architects 1967, *Future Role of the Architect and the Likely Structure of Architectural Practice*, Royal Australian Institute of Architects, Canberra.

Royal Australian Institute of Architects (ed.) 2000, *Architecture Schools of Australasia 2000*, RAIA National Office, Canberra.

Royal Australian Institute of Architects 2002, *Education Policy*, viewed 10 January 2004, <http:// www.architecture.com.au/i-cms_file?page=543/EDUCATION_POLICY_END-D_COUNCIL_NOV_0_AMENDED_NOV02_w_coverÖ.pdf>.

Royal Institute of British Architects 1992, *The Strategic Study of the Profession*, London.

Royal Institute of British Architects 1999, *Architecture Education for the 21st Century. RIBA Review of Architectural Education*, viewed 21 November 2001, http:// http://site.yahoo.net/education-centre/revofed.html>.

Schon, D 1983, *The Reflective Practitioner: How Professionals Think in Action*, Temple Smith, London.

School of Architecture, Planning and Landscape Architecture 1985, *Re-Accreditation Submission for the Bachelor of Arts (Environmental Design), Bachelor of Architecture and Graduate Diploma in Urban and Regional Planning*, Tasmanian State Institute of Technology, Launceston.

Seidman, I 1998, *Interviewing as Qualitative Research*, Teachers College Press, New York.

Silverman, D 1995, *Interpreting Qualitative Data*, Sage Publications, London.

Spence, R 1989, 'Constructive Education', Architectural Review, 185(7), pp. 27-33.

State and Territory Registration Boards and the Royal Australian Institute of Architects 1997, DOC ACRP 02: Australian Architectural Course Recognition and Accreditation Procedure: NVP Report, viewed 15 November 2002, <http://www.architecture.com.au/i-cms_file?page=/1/23/198/Websiteaustarchcourserecogaccredprocbooklet2-200201.pdf>.

Stansfield-Smith, C 1999, 'Chairman's Foreword' in Royal Institute of British Architects (ed.), *Architecture Education for the 21st Century. RIBA Review of Architectural Education*, viewed 21 November 2001, http:// http://site.yahoo.net/education-centre/revofed.html>.

Sutherland, P (ed.) 1997, 'Experiential Learning and Constructivism: Potential for a Mutually Beneficial Synthesis', in Adult Learning: A Reader, Kogan Page, London, pp. 82-91.

Swentarton, M 1989, *Artisans and Architects: The Ruskin Tradition in Architectural Thought*, Macmillan Press, London.

Tasmanian Chapter of the Royal Australian Institute of Architects, 1980, *The John Lee Archer Award. Award for a Building of Excellence in the Non-Residential Category.*

Tasmanian College of Advanced Education 1973, *Department of Environmental Design: Handbook*, Hobart.

Tedlock, B 2000, 'Ethnography and Ethnographic Representation', in N. Denzin and Y. Lincoln (eds), *Handbook of Qualitative Research*, Sage Publications, Thousand Oaks, California.

United States, Department of Energy 2004, *Solar Decathlon*, United States, Department of Energy, viewed 14 March 2004, < http://www.eere.energy.gov/solar_decathlon/follow.html>.

University of Oregon, 2002 *Design Build Program, University of Oregon*, viewed 17 June 2002, <http://architecture.uoregon.edu/archgst/special_programs/design-build.html>.

University of Tasmania 1994, *Department of Architecture Report: Educational and Research Facility in Timber Architecture and Engineering*, University of Tasmania, Launceston.

University of Tasmania 2000, *School of Architecture: Course Recognition and Accreditation Submission*, University of Tasmania, Launceston.

van der Plaat, D 1999, 'Beyond Ruskin: Arnoldian Themes in William Lethaby's Conception of Architecture' in R Blythe and R Spence (eds.) *Thresholds. Papers of the Sixteenth Annual Conference of the Society of Architectural Historians Australia and New Zealand,* University of Tasmania, Launceston.

van der Schans, G 1999, 'Learning through making', *Architectural Review Australia*, 69(Spring), p. 28.

Wallis, L, Clayton, I, Hall, J and Kelly, A 2004, 'The Changing Role of the Workshop in Architectural Education (a Tasmanian Case Study)' in T Rizzuto (ed.), *The Bauhaus Legacy: Myth, Reality and Reevaluation*, Anthony Rizzuto, Atlanta, Georgia.

Wallis, L, Bromberek, Z, Clayton, I, Green, R 2002, 'Plugging the Gaps: Learning by Making (UTas Case Study)', Modern Practice of Architectural Science: from Pedagogy to Andragogy?, Deaking University, Geelong, pp. 549-556.

Wallis, L 2001, 'Building Better Architecture Students', *Proceedings of the Australasian University Building Educators Association. Constructing and Managing the Built Environment*, University of South Australia, Adelaide, pp. 9 – 21.

Wilton-Ely, J 1977, 'The Professional Architect in England', in S Kostof (ed.), *The Architect*, Oxford University Press, New York.

Woods, P. 1999, *Successful Writing for Qualitative Researchers*, Routledge, London.